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RAILWAY LOCOMOTIVES AND CARS

FEBRUARY 1956

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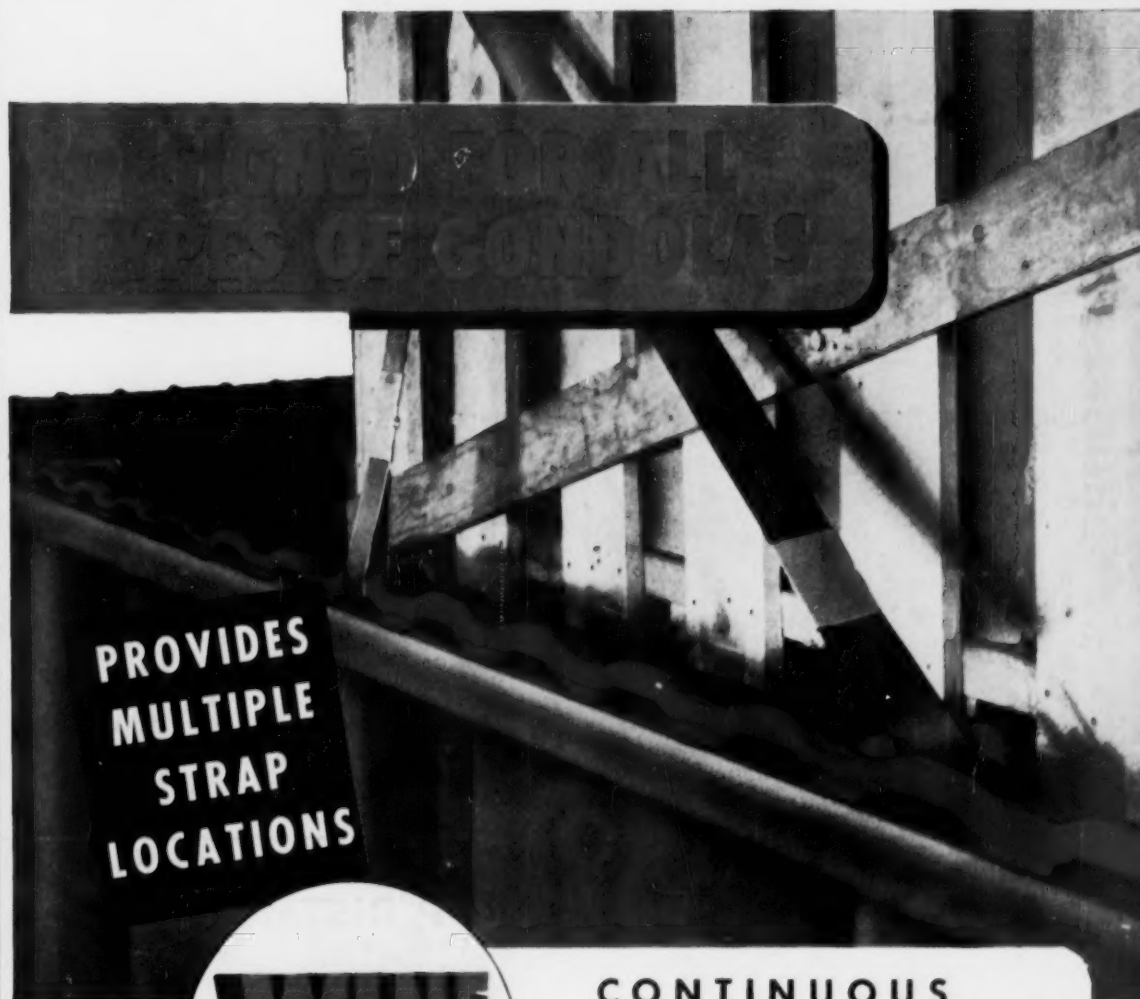
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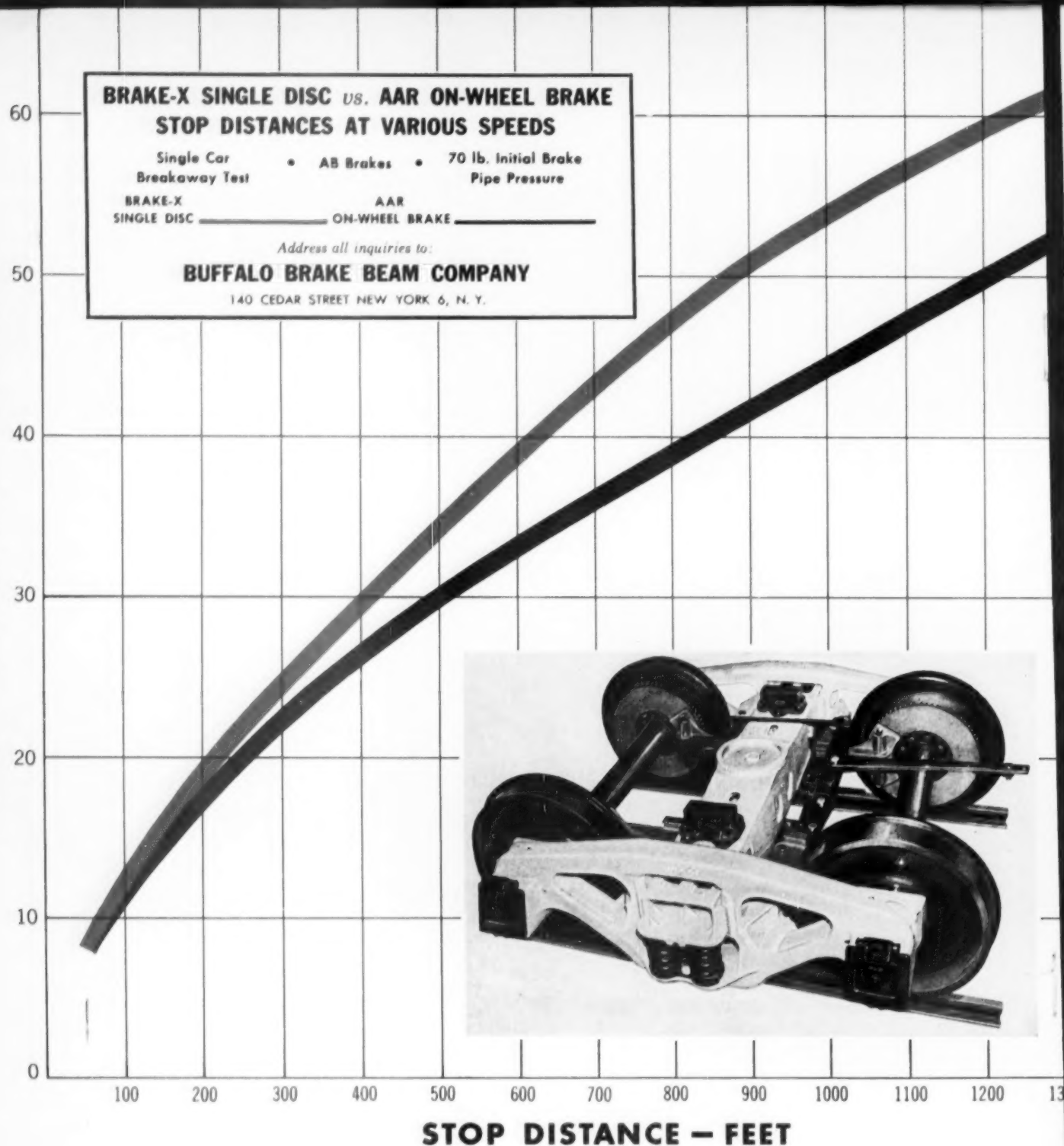
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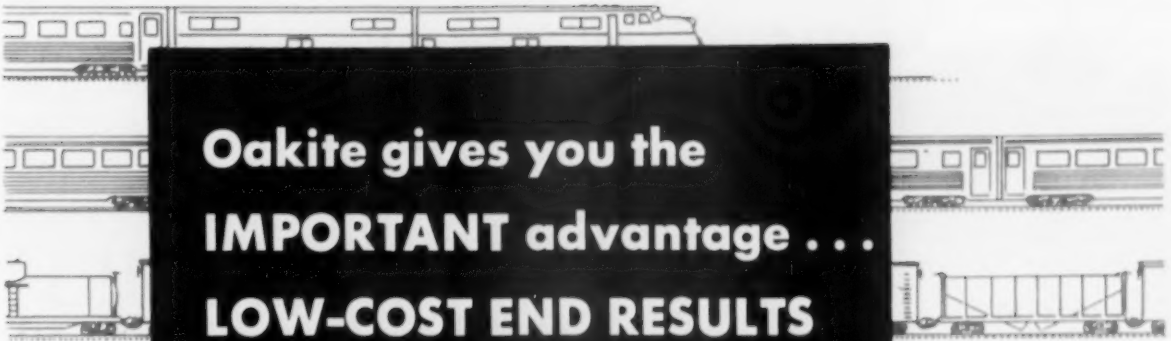
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FEBRUARY, 1956

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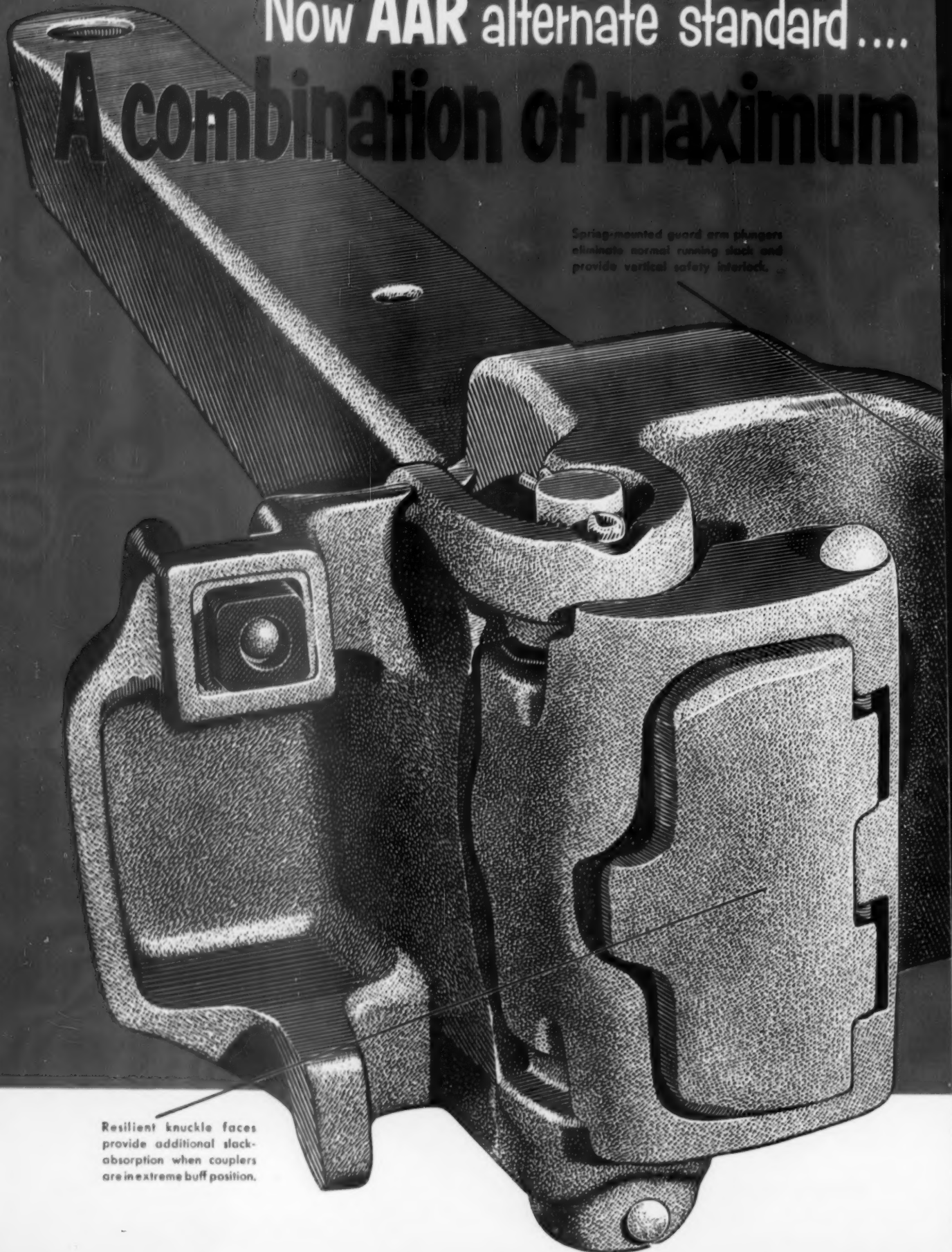
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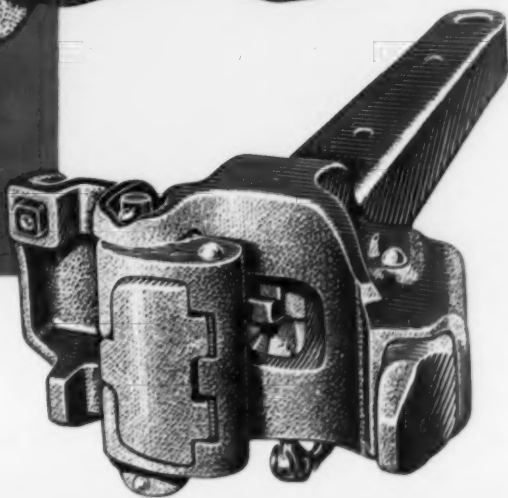
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EQUIPMENT...New Ideas—New Uses



Mobile Journal Tester

The mobile journal flaw detector developed by the Chesapeake & Ohio and described in the September 1955 issue of *Railway Locomotives and Cars* is now built and sold by Sperry Products, Inc. The midget automobile is equipped with a super-sonic Reflectoscope for testing journals of cars on railroad repair tracks. The Reflectoscope is equipped with an auxiliary screen so located that the operator can operate the Reflectoscope search unit and watch the screen at the same time. This car has recently been demonstrated for mechanical department officers of a number of roads. Sperry Products, Inc., Danbury, Conn.



Submersible Plugs and Cable Connectors

All-weather heavy duty submersible plugs, receptacles and cable connectors, known as the "W" series, have been designed to withstand adverse conditions of temperature, corrosion and water submersion. They are available in 3- to 60-pole combinations. With housings constructed of highly corrosive-resistant brass, thick enough to absorb abnormal abuse without cracking, the fittings are tested against

leakage under water at 20 psi air pressure. All rubber parts are fabricated from compounds which are oil resistant and will function properly at minus 40 deg. Plastic insulating materials are self-cleaning in that the material will not sustain an arc after foreign matter has burned off.

All contacts are tin plated for added corrosion resistance and wearability and when mated units are coupled, double gasketing assures a complete water seal. No screws are used in the construction of the units, eliminating danger of short out or leakage. There is more than ample wiring space and the ease of assembly and wiring make these units simple to apply to multi-conductor cable.

Threaded caps attached to rugged chain maintain complete watertight features when units are uncoupled. The units are suitable for use with power, lighting and control circuits and coaxial types are available for audio, radio, video and automation circuits. Pyle-National Company, 1334 N. Kostner avenue, Chicago 51.



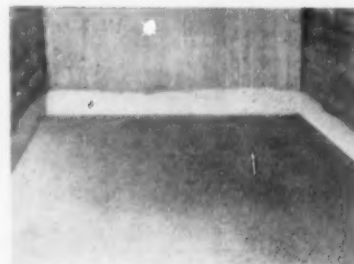
Flange Lubricator

The method of applying Transall flange lubricating sticks to locomotive wheels has been changed by the redesign of the lubricator. The lubricator is now mounted on any truck component that follows the lateral and vertical movements of the wheels. At the same time components of the lubricator have been varied to accommodate its new mounting. The Transall lubricating stick, which has not been changed, is said to produce high mileage for locomotive wheels by reducing flange wear. Transall, Inc., 109 North 11th street, Birmingham, Ala.

Aluminum Weld Cable

Light in weight and constructed to prevent kinking, Type D866 cable, is said to have an excellent degree of flexibility. The combined insulation and jacket of tough vulcanized rubber assures resistance to abrasion, impact, flexing and twisting. The cable provides safety and long service life

and reduces operator fatigue. General Cable Corporation, 420 Lexington avenue, New York 17.



New Plastic Upgrader Designed for Permanence

The latest entry into the field of plastic coatings to give tight cars for high-grade bulk commodities like grits, flour and grain is a coating that is expected to last indefinitely regardless of the abuses a car receives later on.

Called Armortex, the new plastic base material is a tough mastic which bonds to box car floors and walls after initial application. The product, when dry, forms a smooth surface which can be cleaned by normal methods of hosing, blowing, or sweeping. Where cars are washed, there is no water absorption. Armortex is not brittle, 1/8-in. thick film bending around a 1-in. mandrel without cracking. Because the wood color coating is an oil-in-water emulsion, it presents no fire hazard either in storage or application. Also, if exposed to an aromatic solvent long enough to soften the film, no staining or discoloration of the lading would occur as the binder is a colorless resin.

One man can apply this material to a car floor in less than thirty minutes or coat all interior wood surfaces in about three hours. In either case the car will be ready for service the next day. It may be put on by spray, brush, trowel or squeegee, thus eliminating the need to return the car to a central maintenance location for application.

For floors, the recommended method is to pour out one to two gallons of Armortex and spread it with a squeegee. For the sides and ends of box cars a rough spray coat should be applied to get the material into the cracks with a squeegee.

When the plastic is in a container or in the form of a wet film, it should be protected from freezing. While resistant to freezing, it is not advisable to apply the material at air temperatures under 45 deg F. When necessary to apply Armortex during cold weather, salamanders or car heaters may be safely used. As in all cases the surfaces to be coated should be free from dust and broken and loose boards should be either repaired or replaced. J. W. Mortell Company, Kankakee, Ill.

(Turn to page 105)

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Hewing Replaces Moir on Loading Rules

H. L. Hewing, superintendent of the Chicago Car Interchange Bureau, has succeeded W. B. Moir as chairman of the AAR Committee on Loading Rules. Moir, supervisor of car equipment of the Pennsylvania at Pittsburgh, headed the committee for the past 18 years.

During these 18 years, the AAR supervisor of loading was located at Pittsburgh to handle matters pertaining to loading commodities in open top cars. This office has also been transferred, to Chicago along with the chairmanship and a new supervisor has been appointed. He is M. M. Philbin, formerly mechanical inspector of the AAR.

The AAR asks that all communications formerly addressed to Moir at Pittsburgh be sent now to the headquarters of the Mechanical Division at 59 E. Van Buren street, Chicago.

AAR Revises Inspection Procedure

The Mechanical Inspection Department of the AAR began the first of this year conducting checking operations primarily on a regional basis rather than by individual roads. The past practice had been for this department to start checking operations on an individual railroad and remain on that road by traveling from point to point over the entire system until all or most of its shop or yard facilities had been inspected.

Under the new procedure the entire inspection force will cover one large terminal at a time, covering all roads and private car lines in the immediate vicinity. The larger terminal will also be used as a hub for short inspection trips to outlying points. Smaller intermediate facilities will be checked along the way to the next central terminal.

The main reasons for the change in procedure are to reduce the amount of travel (which in many instances involved going back and forth over practically the same routes), and to permit more frequent contact with each road. While each contact will be of shorter duration than previously, it is felt that the increased frequency of contacts will be helpful in clearing up possible misunderstandings where changes in mandatory rules and regulations have been made.

Roads To Use Closer Bearing Clearances

The AAR system of controlled journal bearing clearances has been adopted by a recent vote of AAR member roads and will become effective March 1, 1956. The new system sets up step sizes of bearings for both freight and passenger car boxes with solid bearings. The specific sizes were selected as a result of tests at the AAR

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

		Month of October		10 months ended with October	
Item No.		1955	1954	1955	1954
FREIGHT SERVICE (Data from I.C.C. M-211 and M-240)					
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam.....	6,264	6,335	54,866	62,517
3-06	Total, Diesel-electric.....	37,915	34,547	354,635	323,835
3-07	Total, electric.....	813	674	7,515	6,483
3-04	Total, locomotive-miles.....	45,223	41,807	419,215	394,286
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total.....	1,869	1,667	16,757	15,090
4-06	Empty, total.....	934	905	9,131	8,792
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains.....	14,422	13,513	126,800	125,854
6-02	Total in oil-burning steam locomotive trains.....	3,066	2,717	21,936	22,970
6-03	Total in Diesel-electric locomotive trains.....	109,870	97,384	1,005,155	895,823
6-04	Total in electric locomotive trains.....	2,456	2,077	22,865	19,921
6-06	Total in all trains.....	130,545	116,510	1,183,996	1,069,475
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper).....	1.03	1.02	1.02	1.02
10-02	Loaded freight car-miles.....	44.4	42.8	42.9	41.0
10-03	Empty freight car-miles.....	22.2	23.2	23.4	23.9
10-04	Total freight car-miles (excluding cabooses).....	66.6	66.0	66.3	64.9
10-05	Gross ton-miles (excluding locomotive and tender).....	3,102	2,988	3,033	2,905
10-06	Net ton-miles.....	1,442	1,352	1,378	1,288
12	Net ton-miles per loaded car-mile (M-211).....	32.5	31.6	32.1	31.4
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles.....	66.7	64.8	64.7	63.2
14	Averages per train hour (M-211):				
14-01	Train miles.....	18.4	18.4	18.6	18.7
14-02	Gross ton-miles (excluding locomotive and tender).....	56,329	51,375	55,893	53,844
14	Car-miles per freight car day (M-240):				
14-01	Serviceable.....	49.4	45.5	46.9	42.6
14-02	All.....	47.2	42.5	44.3	40.1
15	Average net ton-miles per freight car-day (M-240).....	1,023	872	921	797
17	Per cent of home cars of total freight cars on the line (M-240).....	39.3	49.7	45.6	53.2
PASSENGER SERVICE (Data from I.C.C. M-213)					
3	Road motive-power miles (000):				
3-05	Steam.....	1,255	1,818	14,096	22,844
3-06	Diesel-electric.....	20,093	20,979	202,512	208,896
3-07	Electric.....	1,229	1,347	13,019	13,856
3-04	Total.....	22,577	24,166	229,634	245,598
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains.....	230,857	241,462	2,348,111	2,465,242
4-09	Total in coal-burning steam locomotive trains.....	7,429	8,821	80,247	112,101
4-10	Total in oil-burning steam locomotive trains.....	3,423	7,283	41,821	85,895
4-11	Total in Diesel-electric locomotive trains.....	205,651	210,490	2,076,724	2,113,933
12	Total car-miles per train-mile.....	9.78	9.60	9.82	9.66
YARD SERVICE (Data from I.C.C. M-215)					
1	Freight yard switching locomotive-hours:				
1-01	Steam, coal-burning.....	332,165	292,002	2,872,346	3,095,254
1-02	Steam, oil-burning.....	54,190	56,931	488,260	544,568
1-03	Diesel-electric.....	3,828,655	3,425,685	35,871,440	32,814,596
1-06	Total.....	4,220,000	3,782,174	39,295,736	36,542,213
2	Passenger yard switching hours:				
2-01	Steam, coal-burning.....	7,652	10,600	81,679	118,829
2-02	Steam, oil-burning.....	6,067	6,640	52,871	51,716
2-03	Diesel-electric.....	246,479	254,960	2,442,036	2,510,760
2-06	Total.....	286,439	296,086	2,837,582	2,968,808
3	Hours per yard locomotive-day:				
3-01	Steam.....	7.2	5.0	5.8	4.8
3-02	Diesel-electric.....	16.1	15.1	15.6	14.9
3-05	Serviceable.....	15.8	14.7	15.3	14.4
3-06	All locomotives (serviceable, unserviceable and stored).....	14.5	12.7	13.6	12.3
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles.....	1.57	1.59	1.63	1.69
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives).....	.77	.76	.75	.75

¹Excludes B and trailing A units.

research Center, the Armour Research Foundation and other studies, which show that bearing performance is improved substantially when this system is properly followed.

The purpose of controlled clearance bearings is to match the actual size of the journal more closely than does the present arrangement where there is but one bearing diameter for each nominal journal size (5 x 9, 5½ x 10, etc.). As the actual journal diameter can vary from the nominal size to ½ in. smaller, clearance under the old system could exceed ½ in. (where a new bearing was applied to a journal worn to the limit). With the new system there will be three ¼-in. step sizes of bearings for each journal size.

As an example, bearing sizes available for the 5½ by 9 journal will be 5.505 in., 5.380 in. and 5.255 in. They will fit journals turned to 5.500 in., 5.375 in. and 5.250 in., respectively. The 5.255-in. bearing will also be used for journals turned to 5.125 in. as it was not considered economically desirable to introduce a fourth step size. Three comparable ½-in. step sizes will be used for each of the remaining five journal sizes. The net result will be that bearings, when first applied will have greater bearing area and consequently lower maximum unit pressures.

The new specifications will be included in the 1956 Interchange Rules. While the original proposal called for the closer

(Continued on page 14)



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Esso Rust-Ban 373 gives equipment complete protection from corrosion in one fast application. More and more railroads are finding it ideal for

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- 4.** Economy is provided by excellent coverage — about 350 square feet per gallon. And Esso Rust-Ban 373 is easily removed by any good petroleum solvent such as Varsol.

Esso Rust-Bans are available in several types to meet every preservative need. For more information, write: Esso Standard Oil Company, Railroad Sales Division, 15 West 51st St., New York 19, N. Y.



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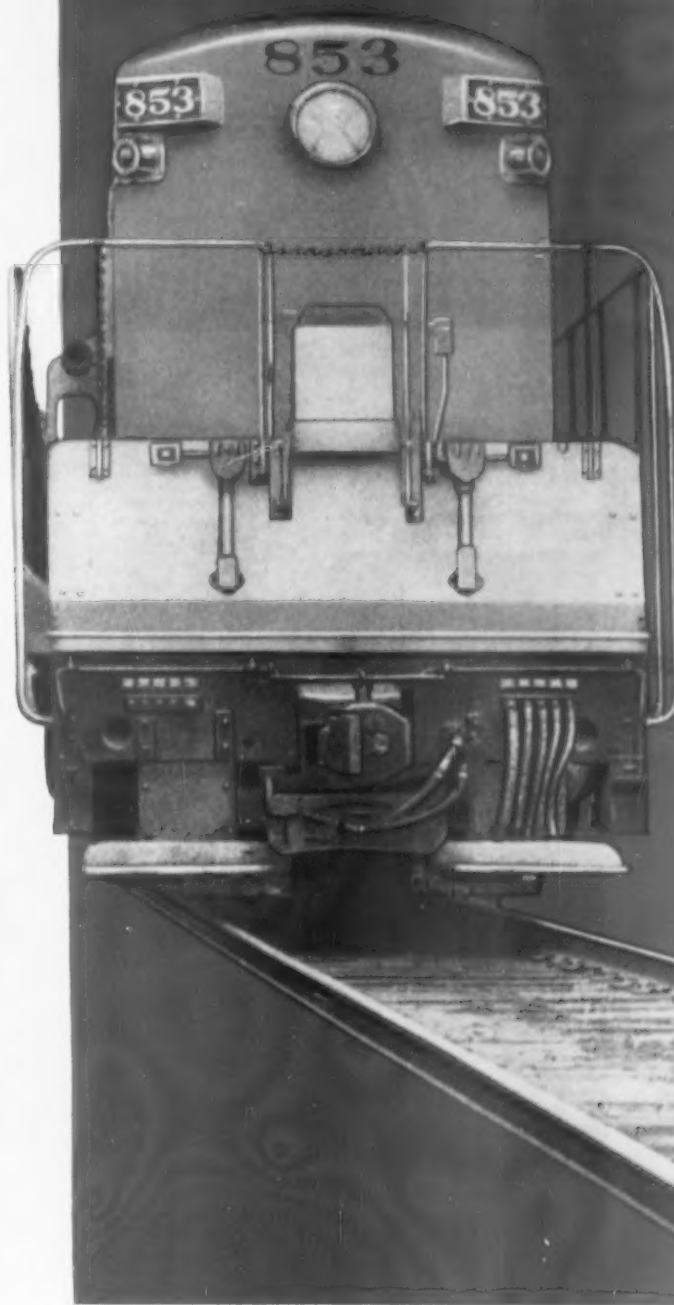
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If you would like a copy of the colorful Train Master booklet, we'll gladly send one by return mail. Write:
Fairbanks, Morse & Co., Chicago 5, Ill.

NEWS

(Continued from page 10)

clearance bearing to be required from January 1, the revision will not go into effect until March 1. This delay is to give the additional time necessary to prepare for full compliance, especially in regard to obtaining the new gages needed. These will probably have to be made in railroad shops initially as it is not definite that the manufacturers will be able to deliver them in time.

Broadley Becomes LDC Director

Peter R. Broadley has been appointed director of research of the Locomotive Development Committee of Bituminous Coach Research, Inc., succeeding John I. Yellott, resigned. Mr. Broadley, who is on leave as mechanical engineer of the Central of New Jersey, has been LDC's assistant director of research since 1947.

PERSONAL MENTION

Atchison, Topeka & Santa Fe



J. P. Morris



T. T. Bickie

JOHN P. MORRIS, general manager—mechanical department, at Chicago, has retired. Born: Fort Madison, Iowa, March 16, 1890. Education: Public schools and

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road and builder	No. of units	Horse-power	Service	Other detail
CENTRAL OF GEORGIA: Electro-Motive	6	1,750	.....	Estimated cost, \$984,000
DENVER & RIO GRANDE WESTERN: Electro-Motive	12	1,750	Road switch.	Anticipated delivery, July.
GREAT NORTHERN: Electro-Motive	24	.....	Road switch.	.....
ILLINOIS CENTRAL: Electro-Motive	70	.....	General purpose	Estimated cost, \$11,900,000
UNION PACIFIC: Aldo Products	25	1,000	Switch.	.....
WARREN: Fairbanks, Morse	6	2,400	.....	Train Master units. Each to be equipped with a steam generator.

FREIGHT-CAR ORDERS

Road and builder	No. of cars	Type	Cap., tons	Length, ft.	Other detail
BOSTON & MAINE: Pullman-Standard	539	Box	70	40	Complete order of 1,000 cars to be roller-bearing equipped.
	300	Hopper	70	53	
	100	Flat	70	53	
	26	Cov. hopper	70	53	
	35	Box	70	53	Insulated, for handling milk.
CANADIAN NATIONAL: Eastern Car	700	Box	50	50	.....
	100	Gondola	70	50	.....
Canadian Car & Fdry.	900	Box	50	50	.....
	100	Flat	50	50	.....
National Steel Car	400	Box	50	50	.....
	200	Refrig.	50	50	.....
	25	Refrig.	30	30	.....
Marine Industries	200	Cov. hopper	70	50	.....
CENTRAL OF GEORGIA: Pullman-Standard	500	Box	70	50	For August delivery. Approx. cost, \$3,400,000.
	25	Cov. hopper	70	50	Cost, \$205,000.
Company shops	20	Flat	70	50	With depressed centers. Cost, \$312,700.
CENTRAL OF NEW JERSEY: Pullman-Standard	100	Cov. hopper	70	50	Estimated unit cost, \$7,885. Delivery expected, June.
CHICAGO & NORTH WESTERN: Pullman-Standard	1,201	Box	70	50	Approx. cost, \$8,500,000. For third quarter delivery.
CHICAGO GREAT WESTERN: ACF Industries	100	Hopper	70	50	.....
General American	100	Box	50	50	.....
Pullman-Standard	200	Box	50	50	.....
CHICAGO, INDIANAPOLIS & LOUISVILLE: Pullman-Standard	50	Box	70	50	With 8-ft doors
	130	Box	70	50	With 6-ft doors
	20	Cov. hopper	70	50	.....
DETROIT & TOLEDO SHORE LINE: General American	100	Box	50	50½	For third quarter delivery.
DETROIT, TOLEDO & IRONTON: Pullman-Standard	175	Box	50	50	Approx. cost, \$1,500,000.
DULUTH, SOUTH SHORE & ATLANTIC: General American	6	Airslide	50	50	Third quarter delivery.
Pullman-Standard	100	Box	50	50	For December delivery.
ERIE: Company shops	500	Box	70	50	Approx. cost, \$4,000,000.
GREAT NORTHERN: Pullman-Standard	300	Hopper	70	50	.....
	200	Gondola	70	52½	.....
Company shops	750	Box	70	50	.....
KANSAS CITY SOUTHERN: Pullman-Standard	600	Box	50	50	Includes 100 DF cars. Estimated cost, \$4,800,000. Dec. 1956-Jan. 1957 delivery.
MERCHANTS DESPATCH TRANSPORTATION: Pacific Car & Fdry.	50	Refrig.	70	50	Mechanically activated. Deliveries to start in June.
MERCHANTS DESPATCH TRANSPORTATION-NORTHERN REFRIGERATOR LINE: Pacific Car & Fdry.	1,000	Refrig.	40	50	Deliveries to start in June.
MIDNEAPOLIS, ST. PAUL & SAULT STE MARIE: (Builder not announced)	300	Box	50	40½	.....
	200	Box	50	50½	.....
	100	DF box	50	50½	.....
	200	Ore	70	50	.....
	6	Gondola	70	50	For steel sheet loading.
MINNEAPOLIS & ST. LOUIS: Pullman-Standard	50	Cov. hopper	70	50	Cost, \$375,000.
NEW YORK CENTRAL: Pullman-Standard	1,000	Hopper	70	50	.....
	500	Cov. hopper	70	50	.....
ACF Industries	1,500	Hopper	70	50	.....
Greenville Steel Car	1,000	Hopper	70	50	.....
General American	500	Hopper	70	50	.....
Despatch Shops	5,250	Hopper	70	50	.....
	1,500	Box	50	40½	.....
	2,000	Box	50	50½	.....
	1,000	Box	50	50½	With Evans auto-loading equipment.
	500	Box	50	50½	With Evans DF loading equipment.

business college. Career: Began as a machine operator in 1904 on the Santa Fe. Subsequently served as machinist apprentice, machinist, machinist gang foreman,

roundhouse foreman, and general foreman at Shopton, Iowa; master mechanic and mechanical assistant at Chicago; mechanical superintendent at Shopton; general

SINCE THE CLOSING OF THE JANUARY ISSUE

FREIGHT-CAR ORDERS—Continued

Road and builder	No. of cars	Type	Cap., tons	Length, ft.	Other detail
PACIFIC FRUIT EXPRESS:					
Company shops	1,800	Refrig.	50		Mechanically refrigerated. Deliveries of 2,000 cars Dec. 1956-June 1957. 175 ice bunker cars to be converted to mechanical refrigeration at a cost of \$1,700,000. Work to start in March, completed in June.
Pittsburgh & Lake Erie	2,000	Hopper	70		Deliveries to begin in third quarter
Pittsburgh & West Virginia	50	Cov. hopper	70		May or June delivery.
Pullman-Standard	100	Box	50		Delivery first quarter '57.
Bethlehem Steel	100	Gondola	70		Delivery fourth quarter '56.
READING:					
Bethlehem Steel	1,000	Hopper	55		
	500	Hopper	70		
ST. LOUIS SOUTHWESTERN:					
Pullman-Standard	700	Box	50	40½	1957 delivery.
Bethlehem Steel	200	Gondola	70	52½	Fixed end type. 1957 delivery.
Greenville Steel Car	50	Flat	50	53½	1957 delivery.
SOUTHERN:					
Pullman-Standard	2,000	Box	50	50½	With "soft-ride" trucks, ventilators, Nailable Steel floors, and steel-lined interiors.
	500	Coal	70		Hopper bottom.
	100	Hopper	70		Side dump type.
	225	Box	50	50½	For third quarter delivery.
	6	Hopper	70	40½	For third quarter delivery.
Greenville Steel Car	100	Gondola	70	65½	Deliveries of the 2,800 cars to begin mid year.
Thrall Car	100	Flat	70	53½	
	15	Flat	90	30	With depressed centers. For third quarter delivery.
TEXAS & PACIFIC:					
Company shops	100	Box	50		
	100	Gondola	70		
	30	Cov. hopper	70		
Trailer Train Co. ACF Industries	1,000	Flat		35	Four-wheel, air suspension roller bearing cars for piggy-back service. Estimated unit cost, \$5,000. (See page 63 for more details.)
UNION PACIFIC:					
Company shops	800	Box	50		
	200	Box	50		Insulated.
General American	100	Hopper	70		
WABASH:					
ACF Industries	300	Box	50		
	100	Box	50		For New Jersey, Indiana & Illinois.
General American	800	Box	50		
	100	Box	50		For NJ&I
Bethlehem Steel	50	Gondola	70		
Pullman-Standard	100	Gondola	70		
	300	Box	50		For Ann Arbor.
	100	Cov. hopper	70		
Company shops	400	Box	50		
	50	Flat		75	
WESTERN MARYLAND:					
Greenville Steel Car	25	Flat	50		Estimated cost, \$198,000. Delivery second quarter.
WESTERN PACIFIC:					
Pullman-Standard	10	Cov. hopper	70		Unit cost, \$8,600. For delivery in June.
	225	Box		50½	With double doors. Unit cost, \$8,600; for fourth quarter delivery.
ACF Industries	100	Hopper	70		Unit cost, \$9,100. For delivery second quarter 1957.
Pacific Car & Fdry	50	Box		50½	Insulated cars with DF loaders. Unit cost, \$12,000. April delivery.

PASSENGER-CAR ORDERS

Road and builder	No. of cars	Type of car	Other detail
GREAT NORTHERN:			
Budd	1	RDC-3	For June delivery.

INQUIRIES AND NOTES

LOCOMOTIVES:

Coal-Burning Gas-Turbine Locomotive.—Test work on a coal-fired gas-turbine developed by the Locomotive Development Committee of Bituminous Coal Research, Inc., is expected to be completed this year, and the first locomotive with such power is expected to be under construction in 1957. Test work being performed at LDC's headquarters at Dunkirk, N. Y., in Alco Products' Locomotive plant, covers improvements in coal-handling, combustion and ash separation.

Chicago & North Western.—Plans to order additional diesel-electric road switching units, possibly 15.

Louisville & Nashville.—Plans to order about 50 diesel locomotives.

FREIGHT CARS:

Atchafalaya, Topeka & Santa Fe.—Will order 500 50½-ft box cars; 100 DF box cars; 100 75-ft flat cars; 700 70-ton 40-ft 8-in. hopper cars; 500 70-ton covered hopper cars; 250 65-ft mill-type gondola cars; 125 70-ton 52½-ft gondola cars; 175 70-ton drop-bottom gondola cars.

Chicago & Eastern Illinois.—Plans to order "several hundred" cars this year.

Chicago, Milwaukee, St. Paul & Pacific.—Will order 50 50-ton Airside covered hopper cars; 50 50-ton insulated compartmentized equipped box cars; 50 50-ft 50-ton mechanical refrigerator cars, and 1,000 50-ft 50-ton box cars.

Chicago, Rock Island & Pacific.—Expects soon to receive from ACF Industries the first of 50 "revolutionary" cars that will combine low initial cost with wide service flexibility. Different superstructures can turn basic car into a gondola, a tank car, or even a passenger-train car. (See page 63 for more details.)

Kansas City Southern.—Expects to order 50 70-ton covered hopper cars.

Pittsburgh & Lake Erie.—Expected to order 1,000 70-ton gondola cars.

PASSENGER CARS:

New York, New Haven & Hartford.—Use of double-deck cars to increase seats for commuters being studied.

mechanical assistant and assistant to vice-president at Chicago. Became general manager-mechanical department in 1950. Chairman of Arbitration Committee, Mechanical

Division, AAR, from 1940 to 1949, and a member of the General Committee, Mechanical Division, since 1949. President of Western Railway Club of Chicago 1951-52.

THOMAS T. BLICKE, mechanical superintendent at Los Angeles, appointed general manager-mechanical. Headquarters, Chicago. Born: May 12, 1909, at Rochester, Minn. Education: High school; I. C. S. steam and electrical engineering and diesel engineering; University of Southern California; Institute of Business Economics. Career: Entered service of Santa Fe in July 1927, serving successively as a machinist apprentice at Shopton, Iowa; stationary fireman and stationary engineer, machinist; diesel maintainer; assistant supervisor of diesel engines and supervisor of diesel engines at Chicago; master mechanic at Dodge City, Kan.; mechanical assistant at Chicago, and mechanical superintendent at Los Angeles (1950).

V. L. MARLO appointed mechanical superintendent, Eastern mechanical district, at Chicago.

H. F. MACKEY, mechanical superintendent, Eastern mechanical district at Chicago, appointed mechanical superintendent at Los Angeles.

HENRY N. CHASTAIN, master mechanic at Chicago, transferred to Argentine, Kan.

LOUIS L. LUTHEY, master mechanic at Galveston, Tex., appointed master mechanic at Chicago.

Atlantic Coast Line

W. C. WRIGHT appointed general foreman at Florence, S. C.

E. B. WHITE appointed master mechanic at Tampa, Fla.

Baltimore & Ohio

DOUGLAS C. TURNBULL, JR., executive assistant to the president, appointed vice-president, research and development.

Boston & Maine

G. E. SPEAR, road foreman of engines at Mechanicsville, N. Y., appointed road foreman of engines, Portland division.

PAUL Z. BAKER appointed road foreman of engines at Mechanicsville, N. Y.

HENRY P. SULLIVAN appointed general foreman at "A" House, East Cambridge, Mass.

Canadian National

HARRY TAYLOR, assistant general superintendent motive power (works), Western region at Winnipeg, Man., appointed general superintendent of motive power and car equipment, Western region.

V. E. MORTON, division master mechanic at Toronto, appointed assistant superintendent, Toronto terminals.

Central of Georgia

HERBERT L. BISHOP, JR., appointed general road foreman of engines. Headquarters, Macon, Ga.

Chicago, Burlington & Quincy

R. W. HOLLON, mechanical inspector at Chicago, retired.

(Turn to page 18)

MAKING TEST DATA COMPLETE...

Practically all types of cars
now roll on the new steel wheel...

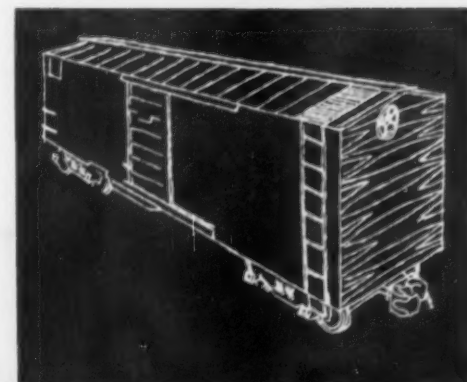
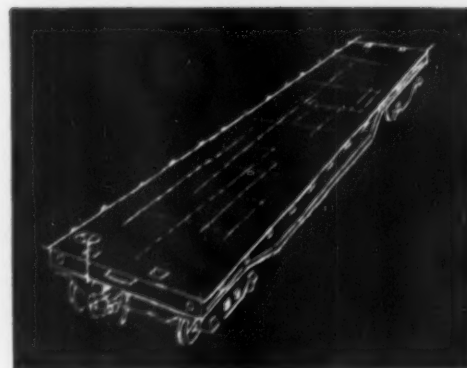
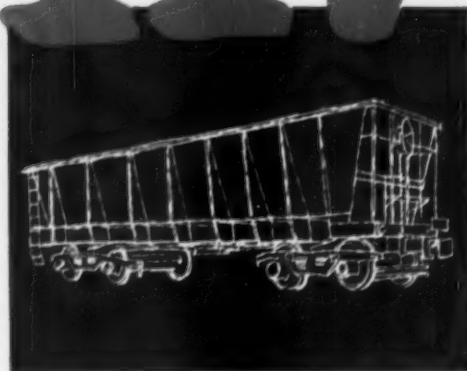
the **GRIFFIN**

Fifty-five railroads are now using thousands of
new Griffin EQS steel wheels...*under
practically all types of service conditions.*

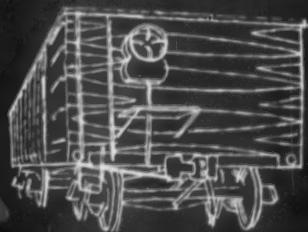
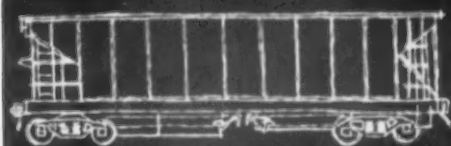
The record of service has been outstanding...
it is proving, in the most conclusive possible way,
longer life and better wear...*another
way of saying lower costs per car mile.*

The Griffin EQS wheel comes in fewer tape sizes...
accurate in all other dimensions to .020" tolerance
...almost perfectly balanced...and with
strong, uniform flanges and rims.

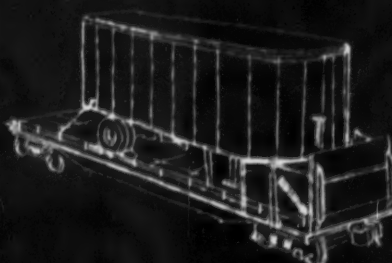
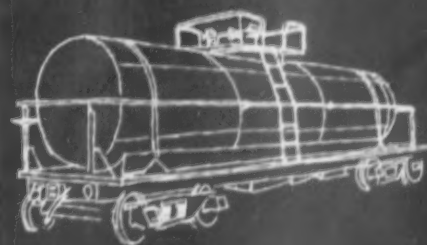
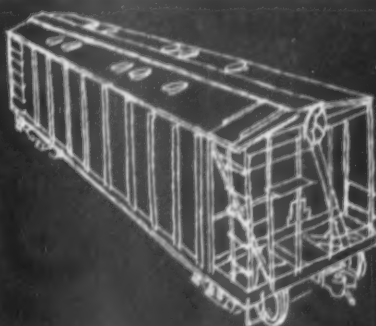
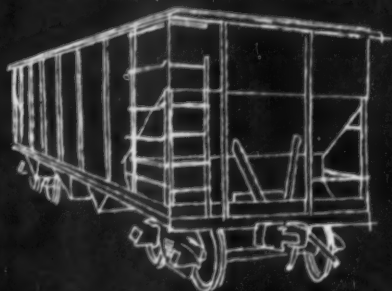
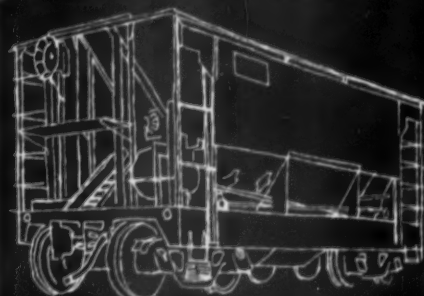
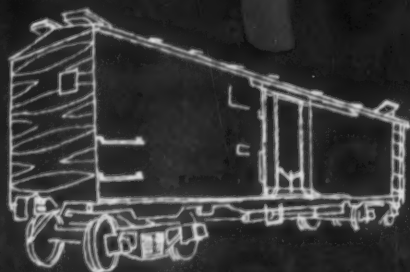
Give the "green" to **GRIFFIN**
and watch your costs go down!



EQS



ELECTRIC QUALITY STEEL



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445 N. Sacramento - Chicago 12

Twelve modern plants - strategically located for service

In Canada: GRIFFIN STEEL FOUNDRIES, LTD.
St. Hyacinthe, Quebec

PERSONAL MENTION

(Continued from page 15)

Missouri-Kansas-Texas

T. H. EVANS, chief mechanical officer, retired. *Born:* Oct. 15, 1899, Whitewright, Tex. *Education:* Public and high schools; correspondence courses in mathematics and mechanical drawing. *Career:* Began as a machinist apprentice in locomotive shops, MKT of Texas, Denison, Tex., March 15, 1916. Employed as a machinist at various locations, returning to MKT of Texas August 25, 1923. Served as gang foreman at Warden shop and in supervisory and official capacities until October 1945 when he became chief mechanical officer MKT Lines.



H. S. Turner

H. S. TURNER, diesel superintendent, appointed chief mechanical officer at Parsons, Kan. *Born:* Parsons, Kan.; 1903. *Education:* High school and I. C. S. courses in mechanical drawing and diesel engines. *Career:* Joined Katy in 1919 as an engine wiper, progressing through ranks to diesel superintendent.

U. H. PFEL, assistant diesel engineer, appointed diesel superintendent.

New York Central



W. F. Kascal

W. F. KASCAL, chief mechanical officer at New York, appointed assistant vice-president—equipment.

Title of **S. T. KUHN** changed from assistant chief mechanical officer to chief mechanical superintendent.

B. L. STROHL appointed assistant general mechanical superintendent—locomotive, Eastern Region, Headquarter, New York.

Pennsylvania

L. E. SHEARER, gang foreman, Phillips-ton enginehouse, appointed foreman, Osceola enginehouse.

New York, New Haven & Hartford

EDWARD J. KEHOK, special consultant to the president, appointed an executive officer in mechanical department.

DANIEL P. PRENDERGAST, supervisor of locomotive maintenance at New Haven, appointed superintendent of mechanical maintenance at New York, with supervision



E. J. Kehoe



D. P. Prendergast

of mechanical maintenance at Oak Point, New York, Harlem River, Bay Ridge and Pennsylvania station, and marine maintenance.



M. R. Brockman

MAX R. BROCKMAN, assistant vice-president, mechanical, at Washington, retired. *Born:* Greensboro, N. C., December 31, 1894. *Education:* Columbia University. *Career:* Entered railroad service 1912 as a machinist apprentice on the Southern. Subsequently machinist, roundhouse foreman, general foreman, master mechanic, and chief mechanical engineer. Became assistant vice-president, mechanical, in 1947.

RICHARD E. FRANKLIN, superintendent maintenance equipment at Charlotte, N. C., (Continued on page 99)

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
October, 1951	3,116,490	4,131	9,053	13,184	236,384
October, 1952	3,093,990	4,058	8,053	12,111	255,469
1953					
October	3,042,558	3,863	6,493	10,356	293,796
November	2,788,773	1,987	3,404	5,391	517,301
December	2,656,063	1,581	2,550	4,131	642,958
1954					
January	2,583,485	3,082	3,797	6,879	375,561
February	2,445,214	2,953	4,066	7,019	349,370
March	2,658,757	2,196	3,637	5,853	455,813
April	2,570,518	3,079	5,149	8,228	312,411
May	2,713,511	4,416	6,510	10,926	248,353
June	2,662,375	6,597	9,617	16,214	164,202
July	2,678,234	7,956	10,912	18,868	141,946
August	2,696,135	7,568	9,742	17,310	155,756
September	2,614,432	6,740	8,882	15,622	167,355
October	2,852,825	5,182	6,985	12,167	234,472
November	2,717,219	2,515	3,467	5,982	454,232
December	2,751,644	1,501	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364



**DIESEL ENGINE
MANUFACTURERS
RECOMMEND.....**



VALVE GRINDING MACHINES

When it comes to the big jobs, there's nothing like the Sioux No. 682 Valve Grinding Machine for ruggedness, speed, precision, and dependability.

The No. 682-L, equipped with lever operated chucks, has capacity with two chucks, for $\frac{1}{4}$ " to $1\frac{1}{4}$ " valve stems, and $6\frac{1}{2}$ " valve heads. It takes valves up to 18" long with aligner, no limitation when chuck bushings are used.

and...



VALVE SEAT GRINDING EQUIPMENT

A SIOUX No. 682 Valve Grinding Machine is shown grinding valves in head reclamation operations for Diesel locomotives. This picture was taken in the FRISCO Diesel Shop at Springfield, Missouri.

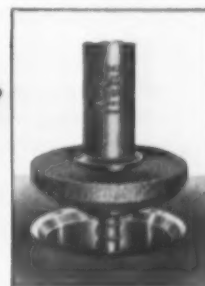
The greatest possible accuracy can be obtained with the Sioux Dual-Action Valve Seat Grinder and Sioux Tapered Pilots. Sioux Tapered Pilots are precision tools and offer the most positive guide known. Dual-action is a controlled fine vibration for grinding and dispersion of the cuttings with the grinding wheel mounted for full contact with the Valve Seat. A perfected system.

Factory approved sets for Allis Chalmers, American Locomotive, Baldwin Locomotive, Case Tractor, Cooper-Bessemer, Ferguson Tractor, General Motors Corp., Hercules Engines, Ingersoll Rand, International Harvester Tractor, International Harvester Truck, John Deere, Massey Harris, Minneapolis-Moline, National Supply, Onan Motors, White Motor Trucks.

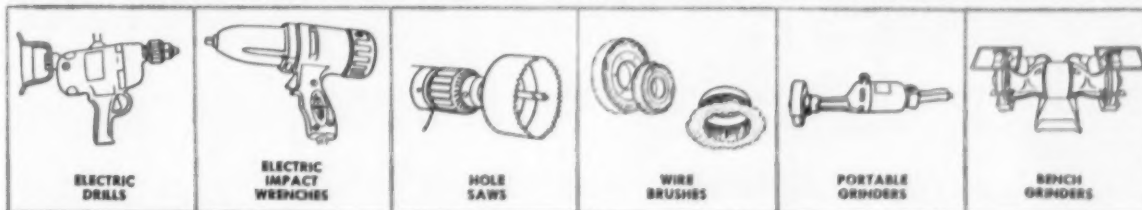


LEFT: Heavy Duty Dressing Tool shown with Heavy Duty Driver dressing grinding wheel.

BELOW: Lifting spring is placed on pilot and grinding wheel brought up to speed before grinding.



USE SIOUX ALL THE WAY THROUGH ... Standard the World Over!



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SYMBOL OF DURABILITY

Streamlite
HAIRINSUL



...outlasts ALL other insulating materials!

The installation of Streamlite HAIRINSUL into new refrigerator cars is a one-time investment, because it outlasts the life of the car, and can be used again and again.

The successful use of all-hair HAIRINSUL in refrigerator cars for half a century is the best testimony that service conditions never impair its high insulating efficiency.

Some of the major reasons why Streamlite HAIRINSUL is specified by leading refrigerator car lines are given at the right. Write for complete data.

AMERICAN HAIR & FELT COMPANY

Merchandise Mart • Chicago, Illinois

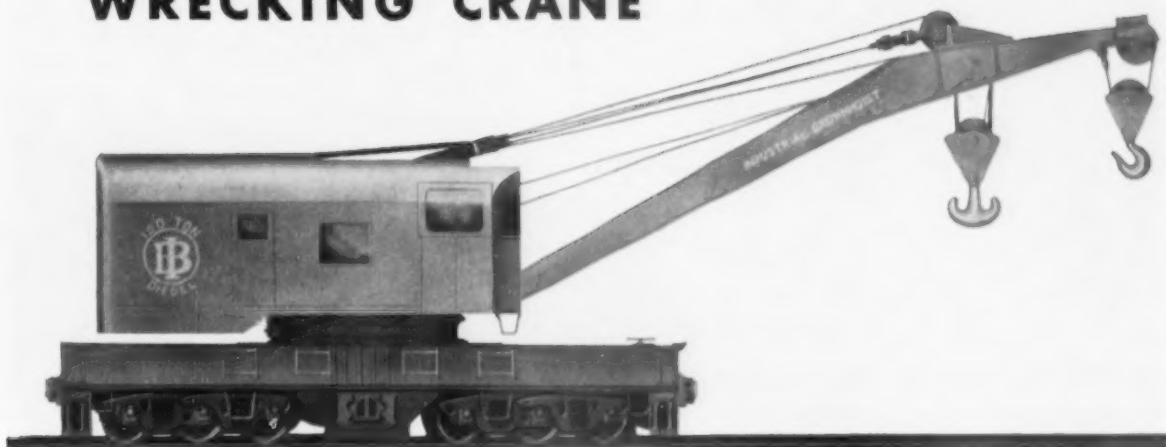
- **LOW CONDUCTIVITY** — Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity — .25 btu per square foot, per hour, per degree F., per inch thick.
- **LIGHT WEIGHT** — Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.
- **PERMANENT** — Does not disintegrate when wet, resists absorption. Will not shake down, is fire resistant and odorless.
- **EASY TO INSTALL** — Blankets may be applied to car wall in one piece, from sill to plate and from one side door to the other. Self-supporting in wall section between fasteners.
- **COMPLETE RANGE** — STREAMLITE HAIRINSUL is available ½" to 4" thick, up to 127" wide. Stitched on 5" or 10" centers between two layers of reinforced asphalt laminated paper. Other weights and facings are available.
- **HIGH SALVAGE VALUE** — The all-hair content does not deteriorate with age; therefore has high salvage value. No other type of insulation offers a comparable saving.



SETS THE STANDARD BY WHICH ALL OTHER REFRIGERATOR CAR INSULATIONS ARE JUDGED

NOW AVAILABLE . . .

NEW BROWNHOIST 150 TON DIESEL WRECKING CRANE



INDUSTRIAL BROWNHOIST'S LATEST . . . 150 TON WRECKER DESIGNED FOR REDUCED AXLE LOADINGS

A smaller version of our famous 250 Ton Diesel Wrecking Crane, the new Brownhoist 150 Ton Diesel Wrecking Crane has been engineered to meet rail, bridge, and trestle conditions where a lighter axle load is necessary. With its up-to-date construction, this powerful twelve-wheel Diesel Crane can better perform the railroad services which have up to now been handled by obsolete, inefficient, steam powered cranes with high operating costs. The car is of welded and riveted structural sections with alloy-steel car-side sills, and travels on two six-wheel equalized steel side frame trucks. A quick disengaging mechanism is provided for train travel. The Diesel engine is equipped with torque converter.

All clutches are air operated including friction reverse clutches. Boom hoist and rotating mechanism are worm-gear driven. The curved wrecking boom is of welded construction with alloy steel members; both main and auxiliary hoist sheaves are equipped with roller bearings; and the auxiliary hoist has a swivel sheave. The operator's position is in the front right hand corner of the cab and the crane controls are arranged for greater efficiency and convenience. The rugged new 150 Ton Diesel Wrecking Crane embodies the principles of design and construction that distinguish all Brownhoist Cranes . . . assuring you of maximum service with minimum maintenance. Write for complete information.

187

BROWNHOIST

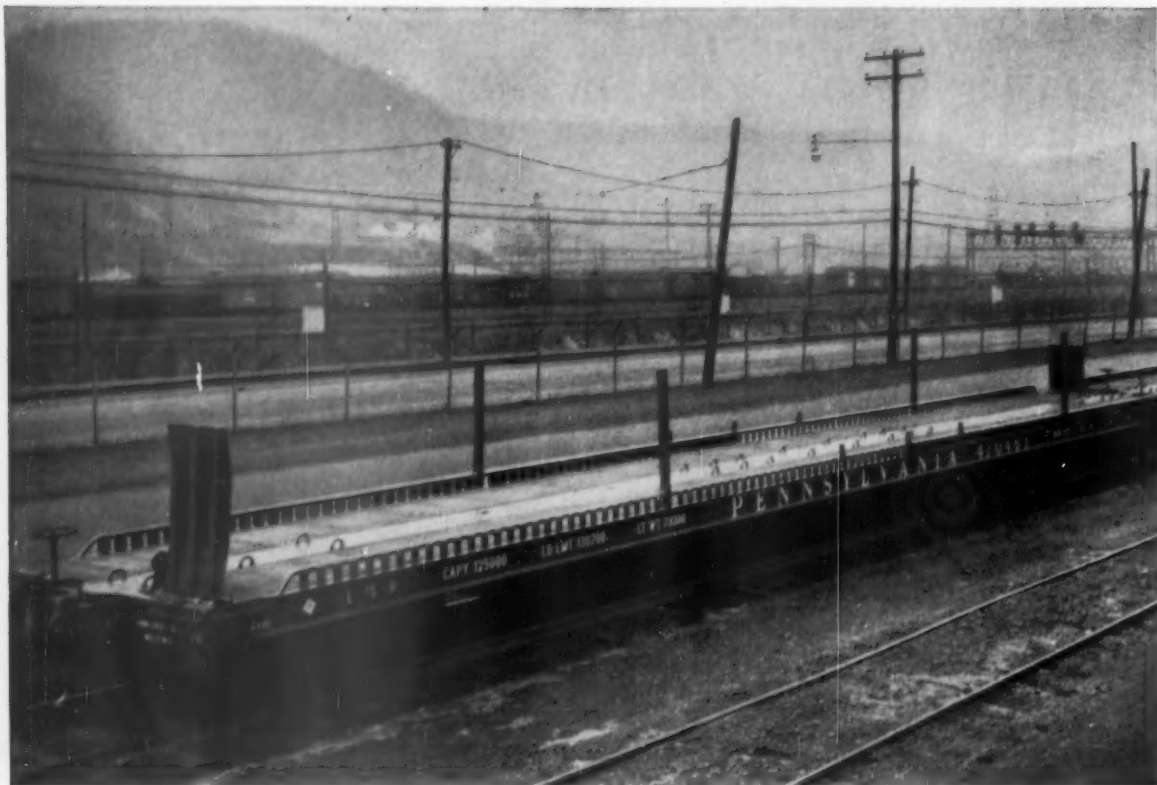
BROWNHOIST MATERIALS
HANDLING EQUIPMENT
GIVES A LIFT TO
AMERICAN INDUSTRY



SUBSIDIARY OF



INDUSTRIAL BROWNHOIST CORPORATION
BAY CITY, MICHIGAN • DISTRICT OFFICES: New York,
Philadelphia, Cleveland, Chicago, San Francisco, Montreal
AGENCIES: Detroit, Birmingham, Houston



High strength in these extra-long flat cars, operated by Pennsylvania Railroad, results from using Mayari R, a product of Bethlehem Steel Co., Bethlehem, Pa. A high strength low alloy steel containing nickel, Mayari R permits stronger construction

without increasing weight. High speed operation of these cars, as well as lower starting resistance and operating cost are afforded by Timken Roller Bearings. Nickel alloyed steels make the bearing races and rollers extra tough.

Nickel alloy helps new type cars keep strength in ... weight down ... corrosion out

BUILT TO HAUL two fully loaded highway trailers, these Truc-Train cars must withstand heavy load concentrations in the long span between trucks.

A job of this sort is made to order for Mayari R, a high strength low alloy steel containing nickel.

Steels of this type allow car builders to strengthen rolling stock while reducing bulk and deadweight, because thin light sections provide the same strength and durability as thicker, heavier sections of plain carbon structural steel.

In addition, the high strength nickel steels often save time and cost per unit by their ready response to fabrication, including welding and cold forming.

Especially important, they offer 4 to 6 times greater resistance to atmospheric corrosion than

does the usual structural steel. As a result, high strength low alloy nickel steels retain much of their original strength over years of use.

This ... plus their resistance to impact, battering and abrasion ... greatly lengthens car life and minimizes maintenance.

High strength low alloy steels containing nickel along with other alloying elements are produced under a variety of trade names by leading steel companies.

Get the facts

Send for a copy of "Nickel-Copper High Strength Low Alloy Steels." Cover to cover, this illustrated booklet is full of helpful information and data. See why nickel steels cut deadweight, add payload capacity, and step up ton-mile revenue. Write for your copy now.



THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street
New York 5, N. Y.

The Engineer's Field Report

CASE HISTORY

Chevron Starting Fluid
PRODUCT

Great Northern Railway
FIRM *Haure, Montana*

Special fluid starts 250-ton crane instantly, saves time in emergencies—even at 50° below



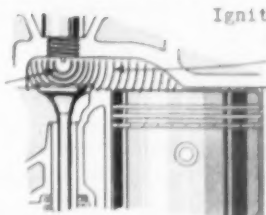
GREAT NORTHERN RAILWAY'S 250-TON, RAILROAD CRANE (above) starts instantly with Chevron Starting Fluid in temperatures ranging to 50° below zero—even after standing idle for months at a time. Former steam-powered wrecker equipment took crew 12 hours to start. This crane with its two 174 h.p. Cummins diesel engines is now available for derailment emergencies on short notice.

"Slow-grind starts on battery power alone waste too much valuable time. Chevron Starting Fluid fires

these engines 'right now'—in any weather." A Great Northern engineer shows how simple it is to insert 7CC gelatin capsule of Chevron Starting Fluid in unit's air-intake system. Fluid is also available in 17CC capsules and 1-pint cans.

Why Chevron Starting Fluid starts engines instantly

Highly
volatile:
7 times
more than
gasoline



Ignition temperature
several hundred
degrees lower
than diesel
fuel

Contains wear-
reducing lubricants

Additives inhibit
ice formation



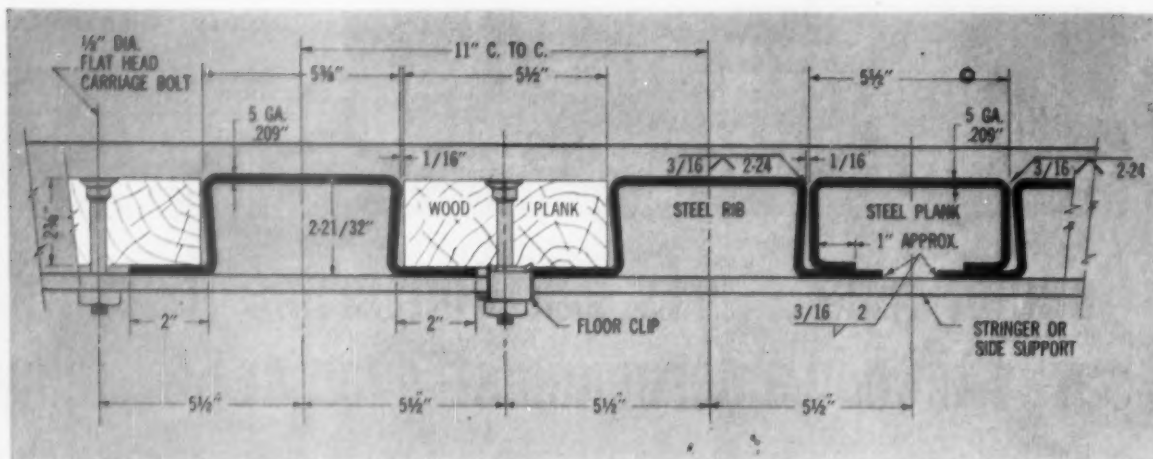
FREE FOLDERS tell more about the Chevron Starting Fluid and Chevron Pressure Primer System. Write or ask for them.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

TRADEMARK "CHEVRON" AND DESIGN REG. U. S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado





Armco "Blueprint"

FOR CAR FLOOR SAVINGS

Here's how Armco engineers can help you design real savings into freight car floors:

First, they'll study blueprints of your car frames—then suggest any changes needed in standard Armco Freight Car Flooring to suit *your specific conditions*.

Armco Freight Car Flooring is designed for long-range economy. The hat-section steel ribs deliver the best known combination of beam strength and floor surface for every pound of steel. Stout wood planks provide real nailability—make every car good for many kinds of lading, bulk or unit.

Add to this the operating economy of strong, well-reinforced floors which need few repairs, and you have savings which continue to grow from time of installation through years of rugged service.

easily installed

When tailor-made Armco Freight Car Flooring arrives at your shops, ribs will be coped to clear rivet heads if your car-construction requires. Where wood nailing strips are impractical, special steel planks are supplied to clear bolsters. To further speed assembly, detailed drawings reach you before steel ribs and planks arrive. This means you can floor or re-floor gondola, box or flat cars on a production basis—without costly fitting of parts.

For more information about this multi-purpose flooring, write for the booklet, "Armco Freight Car Flooring," at the address below.



Each Armco steel rib is welded to the car underframe in several places. This strong, welded lattice greatly increases the resistance of the underframe to twisting and racking.



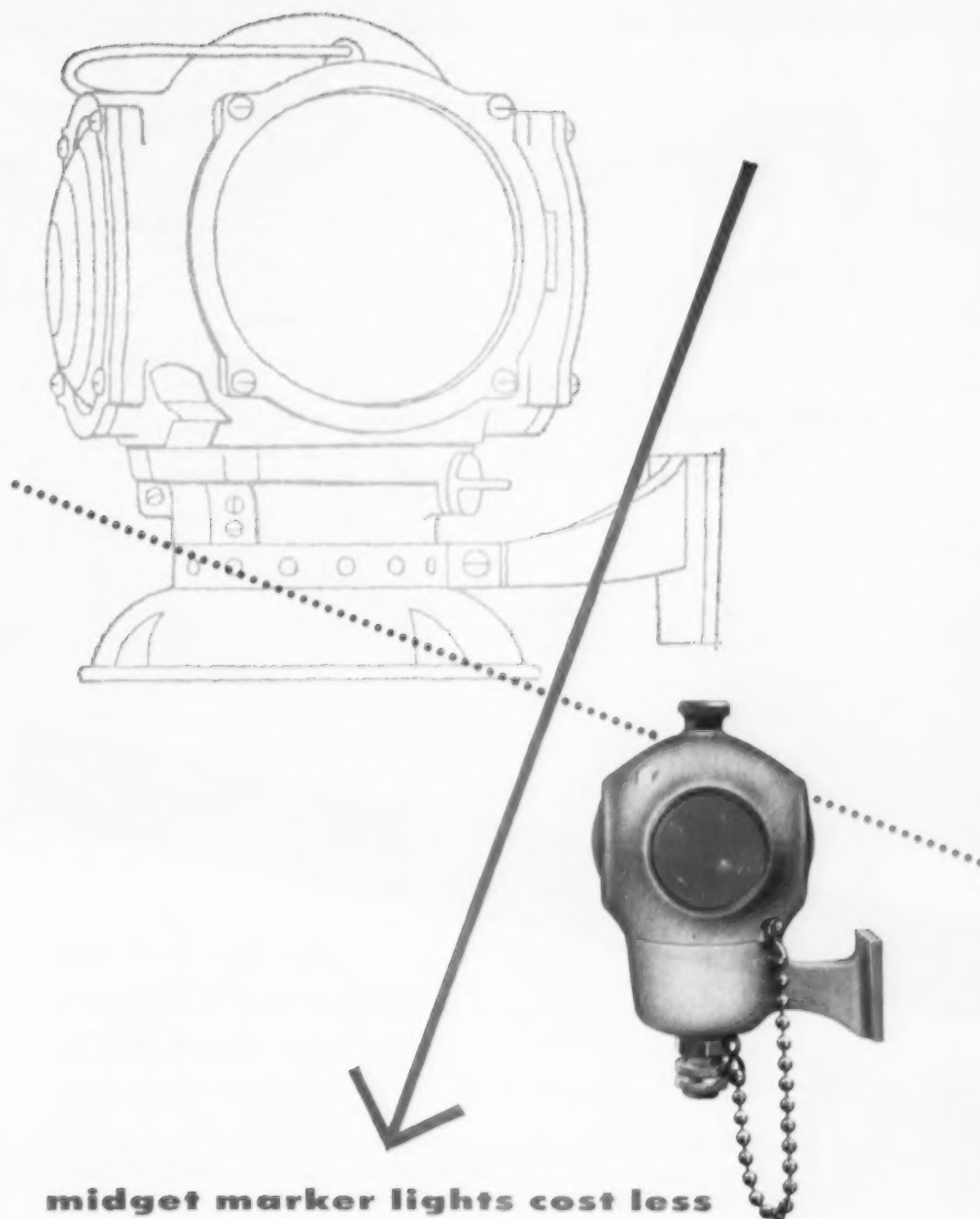
Nailable wood planks that alternate with steel hat sections permit easy fastening of skids and braces—make Armco Freight Car Flooring a truly multi-purpose car floor.

ARMCO STEEL CORPORATION

766 CURTIS STREET, MIDDLETOWN, OHIO



SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION



midget marker lights cost less

- $\frac{1}{3}$ normal size
- lighter weight
- greater beam intensity
- better visibility
- longer service life
- ideal for caboose circuits

A new product representative of Pyle-National's progressive engineering and manufacturing program for American Railroads



THE PYLE-NATIONAL COMPANY

WHERE QUALITY IS TRADITIONAL

1359 North Kostner Avenue, Chicago 51, Illinois

District Offices and Representatives in Principal Cities of the United States: CANADIAN AGENT: The Holden Co., Ltd., Montreal
Export Department: Railway Supply Co., 30 Church Street, New York

LOCOMOTIVE HEADLIGHTS • GYRALITES • TRAINLINE CONNECTORS • MULTI-VENT AIR DISTRIBUTION



You can't beat the Chilled Car Wheel

for low first cost
and for quick delivery
from the AMCCW
plant near you



Quick, low-cost delivery from an AMCCW plant near you—29 in the U. S. and Canada—is one of the tangible advantages of using AMCCW Chilled Car Wheels on your freight cars. Additional economy results from the lower inventories this quick delivery makes possible.

Low first cost and favorable exchange rates make the AMCCW wheel an outstanding value for freight car service.

Today's chilled car wheel is the best ever produced as measured by safety and performance.

In good supply
Available locally
Short-haul delivery
Reduced inventory
Low first cost
Low exchange cost
Increased ton mileage
High safety standards
AMCCW plant inspection
Easier shop handling



Association of Manufacturers
of Chilled Car Wheels

443 North Sacramento Boulevard, Chicago 12, Ill.

Albany Car Wheel Co. • ACF Industries • Griffin Wheel Co. • Marshall Car Wheel & Foundry Co. • Pullman-Standard Car Mfg. Co. • Southern Wheel (American Brake Shoe Co.) • Canada Iron Foundries, Ltd.

SAND THE TRACKS...



NOT THE BEARINGS



IN A SINGLE RUN FROM NEW YORK TO CHICAGO
A DIESEL ENGINE CAN PICK UP ENOUGH GRIT...

to ruin it!

The GRIT is there... the engine picks it up... NOW, IT'S UP TO THE FILTER TO CONTINUOUSLY REMOVE IT! Abrasive substances are the enemy of operating costs and operating schedules. In bad weather they're useful on the *tracks*, but in lubricating or fuel oil—they spell disaster.

WIX Oil Filter Cartridges are the sound answer to the menace of oil contamination. WIX has studied the problem... conducted the continuous research to KNOW the answer... engineered filter cartridges specifically for railroad diesel service to provide maximum "engine-wear insurance."

Write for the WIX Railroad catalog and particulars on how you, too, may have a specialized study made on your oil filtration problems.



wix®

ENGINEERED FILTRATION

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WIX CORPORATION
Railroad Dept. R.L.C.
Gastonia, N. C.

Please send catalog and particulars
on your special oil filtration study.

Name _____

Company _____

Address _____

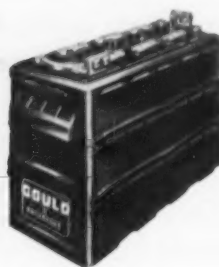
City _____ Zone _____ State _____



**"Battery Performance
is my Business!"**

Your Gould Field Engineer has one job—to make sure you get greatest possible service from your batteries. In performing that job he sees to it that your batteries are properly cared for and maintained; he instructs your personnel in systematic maintenance methods; he helps you anticipate battery needs; he makes sure you get maximum battery performance.

Gould Field Engineering Service is nationwide. Every member is factory-trained . . . has plenty of on-the-job know-how. There's a Gould Field Engineer in your area. He's as near to you as your telephone. Call him. And when you see him, ask him for the new Gould Plus-Performance Plan material for your battery maintenance staff.



America's Finest!
GOULD
KATHANODE BATTERIES
for Diesel Starting

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"BETTER BATTERIES THROUGH RESEARCH"

Always Use Gould-National Automobile and Truck Batteries

**GOULD
Batteries**

— GOULD-NATIONAL BATTERIES, INC.

TRENTON 7, N. J.



COST.....

IS A POOR YARDSTICK
TO JUDGE QUALITY

Diesel locomotive wire should be as dependable and long-lived as money can buy. If it fails under grueling service conditions, the locomotive stands still. That's why quality of diesel locomotive wire should be the determining yardstick, not cost.

Simplex makes two types of diesel locomotive wire. Type A, for conduit and interior wiring, is designed to save space. Type B has a reinforced jacket for exposed locations requiring a heavier, tougher cable.

Simplex Diesel Locomotive Wire retains its physical and electrical properties even in the presence of water and extreme heat. Its jacket has unusual resistance to abrasion, acids, flame, oil, sunlight, and tear *even under extreme heat.*

Make sure your diesel locomotive wire has the quality that can take it by specifying Simplex Diesel Locomotive Wire. To find out more about this wire, send to the address below for Bulletin No. 1016, or contact your nearest Simplex representative.

Simplex

DIESEL LOCOMOTIVE WIRE

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Massachusetts

FACTS ABOUT Exide®

IRONCLAD® CAR LIGHTING AND AIR CONDITIONING BATTERIES

MORE **PASSENGER REVENUE!** ... RESULT OF COOL, COMFORTABLE CARS

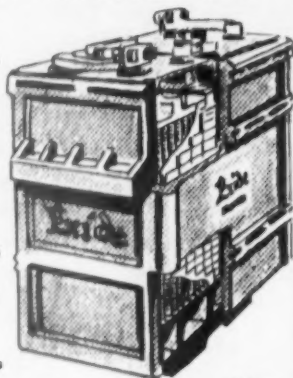
WHEN OLD SOL POURS ON THE HEAT, DEPENDABLE EXIDES KEEP PASSENGERS COOL AND HAPPY. DURING EXTREME HEAT AND LONG STATION STOPS, POWERFUL EXIDE-IRONCLADS KEEP EQUIPMENT FUNCTIONING, WITH COMPRESSORS RUNNING STEADILY. IRONCLAD AIR CONDITIONING AND CAR LIGHTING BATTERIES GIVE YOU HIGH UNIFORM VOLTAGE, EXCEPTIONALLY LONG LIFE, AND LOW COSTS. THEY ARE YOUR BEST POWER BUY—**AT ANY PRICE!**



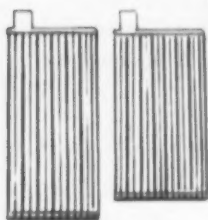
INTRODUCING... THE NEW EH EXIDE-IRONCLAD!

TO SET A NEW STANDARD FOR RAILWAY PERFORMANCE, EXIDE INTRODUCES AN ALL-NEW ENGINEERED AND FIELD-TESTED CAR LIGHTING AND AIR CONDITIONING BATTERY. THE NEW EH—

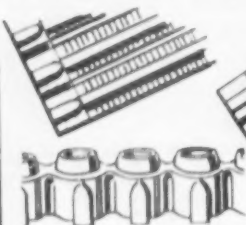
- DELIVERS 100% CAPACITY INITIALLY!
- ITS UNIFORM QUALITY ASSURES SUSTAINED HIGH CAPACITY DURING LONGER USEFUL LIFE!



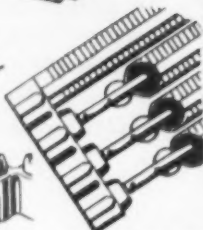
THE NEW EH HAS...



10% LONGER PLATES IN THE SAME PLACE YOU GET MORE POWER FOR A LONGER TIME!

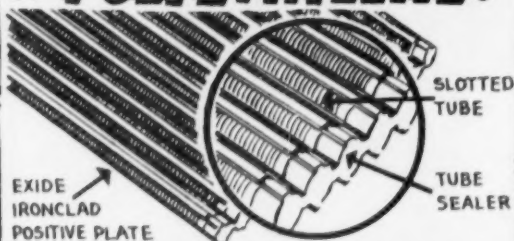


POLYETHYLENE SLOTTED TUBES, AND SEALERS NON-OXIDIZING PLASTIC GIVES LONGER LIFE... PREVENTS SHORTS.



GRIDS WITH SILVIUM THIS NEW EXIDE NON-CORROSIVE ALLOY GIVES HIGH SUSTAINED POWER...LONGER LIFE!

MAGIC POWER TUBES OF POLYETHYLENE!



NOW, ACID-PROOF, NON-CORRODING POLYETHYLENE PLASTIC TUBES AND SEALERS ARE INSIDE ALL EXIDE-IRONCLADS! DEVELOPED IN THE LABORATORY, TESTED IN THE FIELD, AND ALREADY PROVED IN CUSTOMER USE—THIS MIRACLE BATTERY MATERIAL IS THE LATEST IMPROVEMENT IN EXIDE-IRONCLADS. ITS USE GIVES YOU MORE POWER IN THE SAME SPACE! LONGER BATTERY LIFE! BETTER PERFORMANCE! LESS MAINTENANCE! FOR THE AMAZING "INSIDE STORY" ON NEW EXIDE-IRONCLADS WITH POLYETHYLENE, CALL YOUR EXIDE SALES ENGINEER!

WRITE

NOW, CALL YOUR EXIDE SALES OFFICE FOR SPECIFICATIONS OF THE NEW EH. **TEST IT YOURSELF, YOU'LL FIND THE NEW EH EXIDE-IRONCLAD IS YOUR BEST POWER BUY—AT ANY PRICE!**

Exide INDUSTRIAL DIVISION. The Electric Storage Battery Company, Philadelphia 2, Pa.

Since 1902..

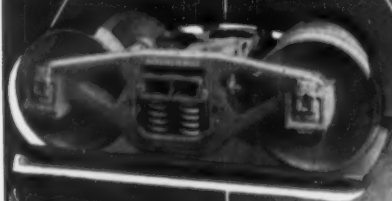
'DEPENDABILITY IN SERVICE'



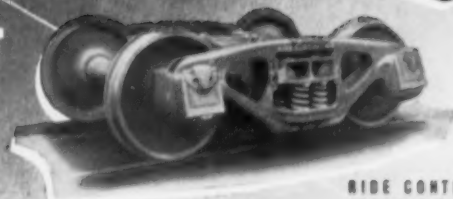
... a time-proven feature of all



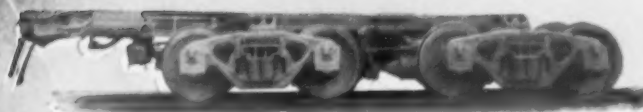
STEEL CASTINGS for RAILWAY EQUIPMENT



BUCKEYE FOUR-WHEEL ON-RIGID FREIGHT CAR TRUCK



RIDE CONTROL (A-3) FREIGHT CAR TRUCK



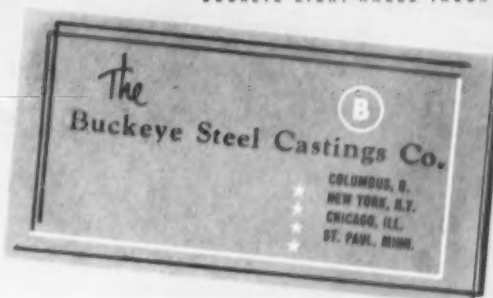
BUCKEYE EIGHT-WHEEL TRUCK



BUCKEYE SIX-WHEEL TRUCK

FOR COMPLETE INFORMATION • CALL or WRITE

Refer Adv. No. 11876



When It's a Bethlehem Wheel You Know It's Good! Here's why: First, the

steel is cast into ingots

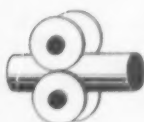


Then begins a series of steps in which the

steel is "worked"—a fundamental that contributes directly to strength and

long life. The first of these steps takes place when the ingots are rolled

into blooms



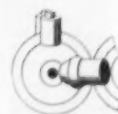
Next, after the blooms are sliced, the heated rounds

are given two forgings



Then they are further worked

in a vertical mill as tread, rim, and web are thoroughly rolled



Each of these "working" steps helps improve the properties of the fin-

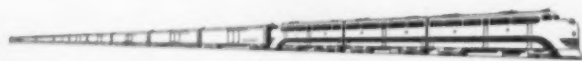
ished wheels



Together, they add to the strength, as well as to

the mileage you get. So cost comes down . . . the cost of the wheels

in service



the cost per mile of actual

use. And that's what counts, as every seasoned railroad man agrees.

BETHLEHEM WROUGHT-STEEL WHEELS

COMPANIONS TO BETHLEHEM FORGED-STEEL AXLES

FREIGHT • PASSENGER • DIESEL



BETHLEHEM STEEL COMPANY, General Offices: BETHLEHEM, PA. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation . . . Export Distributor: Bethlehem Steel Export Corporation

ANNOUNCING

THE NEW

HYATT

HY-ROLL

BEARING FOR

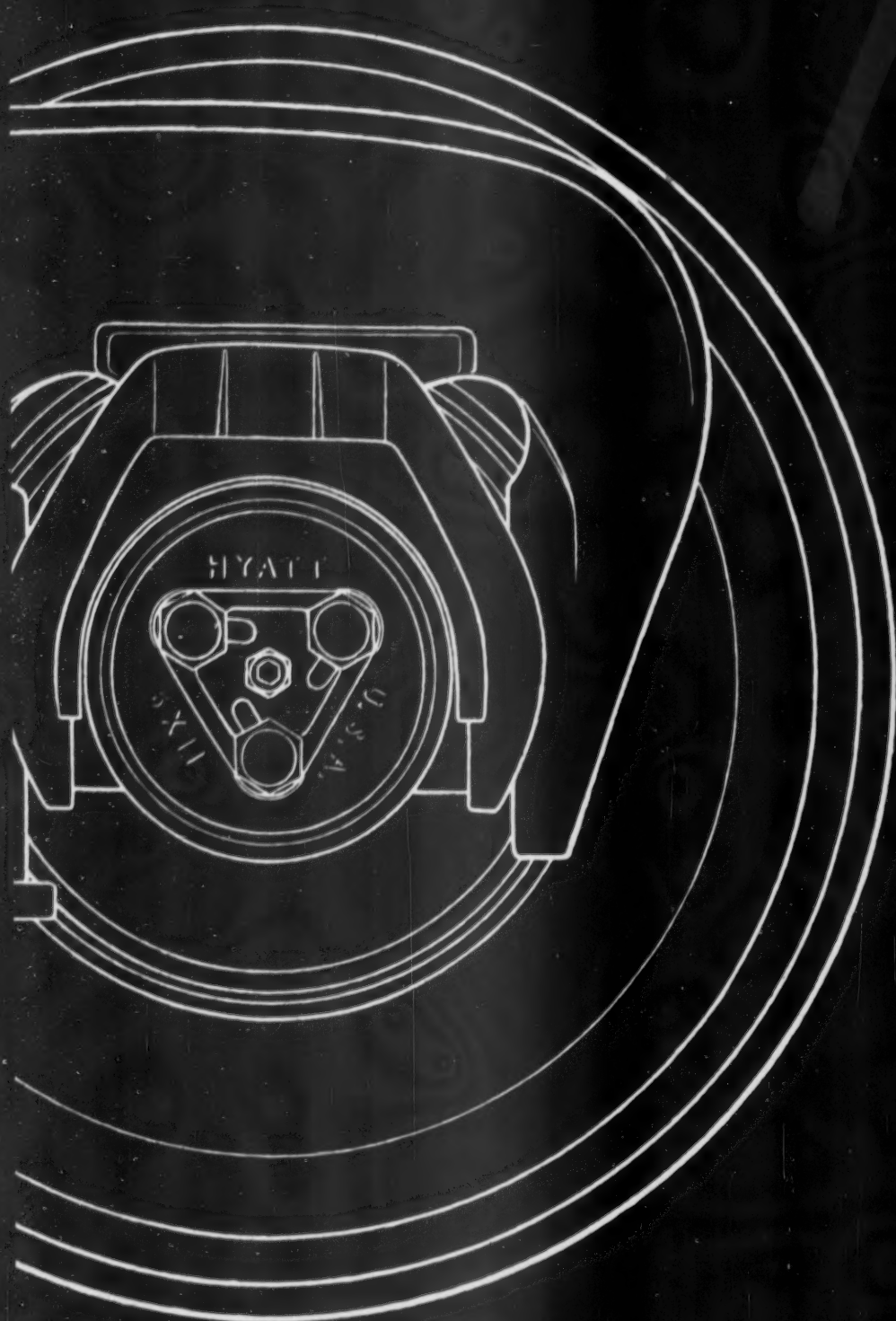
NON-STOP FREIGHT



ANOTHER



CONTRIBUTION TO RAILROAD PROSPERITY



so simplified,

so dependable,

so economical,

it makes the big

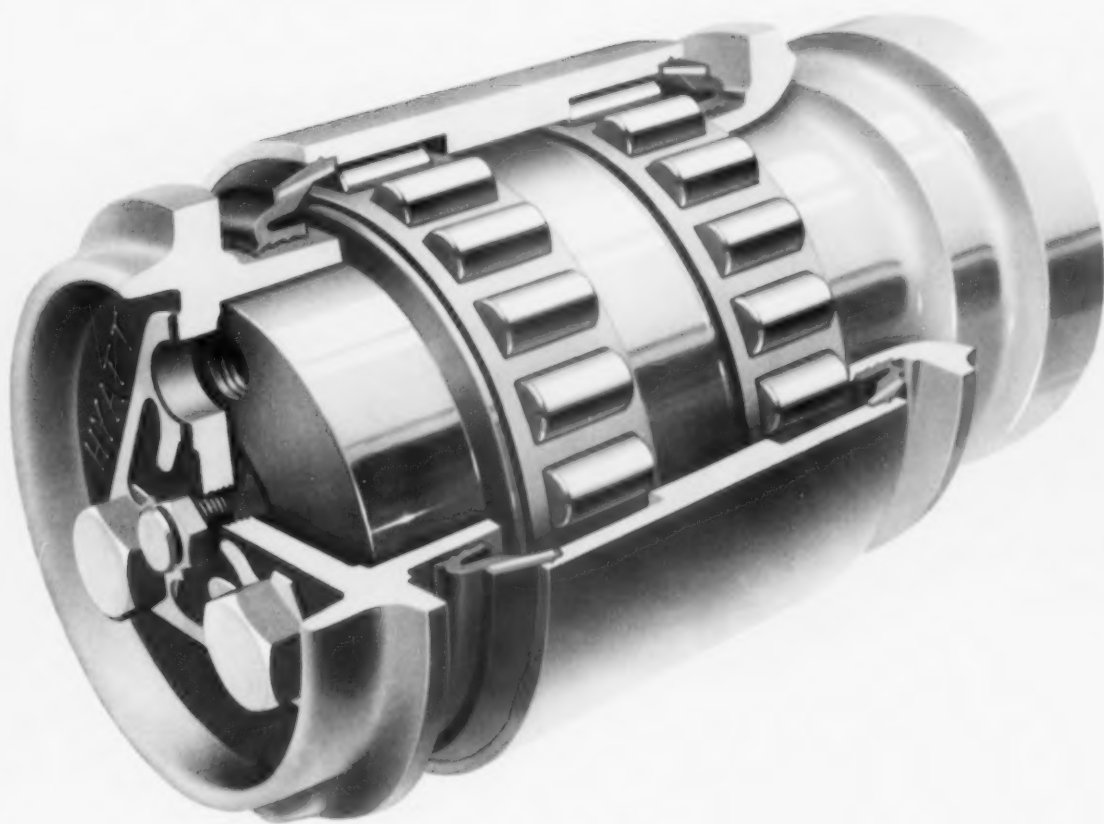
switch to roller

bearing freight

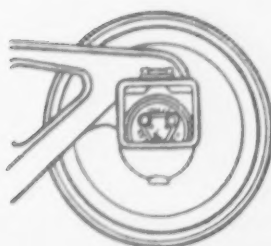
practical!

HYATT *HY-ROLL*

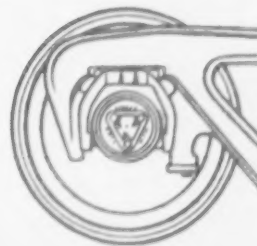
BEARING FOR NON-STOP FREIGHT



THIS ONE BOX FITS BOTH!



INTEGRAL TRUCKS



PEDESTAL TRUCKS



HYATT



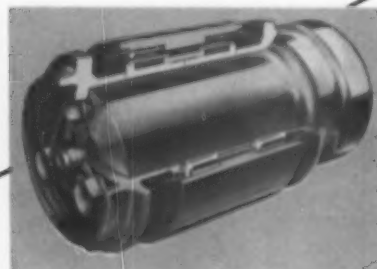
Box arrives completely assembled, with 3-year grease supply sealed in, ready for immediate installation on journals



New HYATT HY-ROLL Roller Bearing requires only this wedge, to fit integral side frame or proposed new pedestal frame



With the addition of this rugged saddle, the same HYATT HY-ROLL Roller Bearing will fit wide jaw pedestal-type side frame



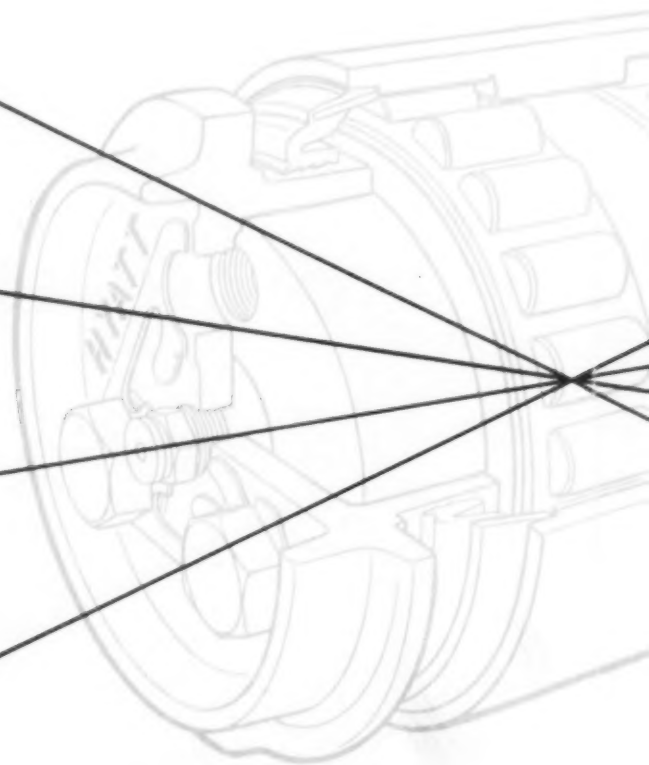
Simplified design assures lower installation and maintenance costs. Only 4 parts on axle; outer races completely eliminated

HYATT HAS BUILT OVER HALF OF ALL USED ON AMERICAN RAILROADS. THIS IS THE END RESULT OF THAT UNEQUALLED

Not only has HYATT built more railroad roller bearings than anyone else—HYATT has built over two-thirds of all those used on diesel locomotives. These bearings must withstand the continual pounding of regularly scheduled high-speed runs—so this know-how amassed by HYATT is particularly significant.

Every single one of these highly successful HYATTS has been built

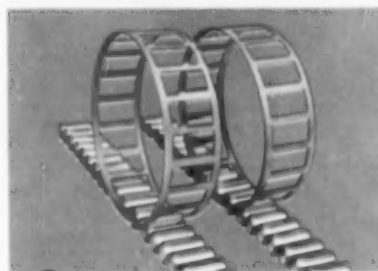
with high
HY-ROL
principle
mainten
already
these a



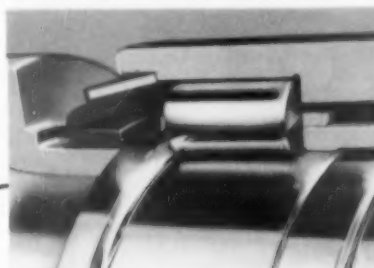
HY-ROLL

BEARINGS FOR NON-STOP FREIGHT

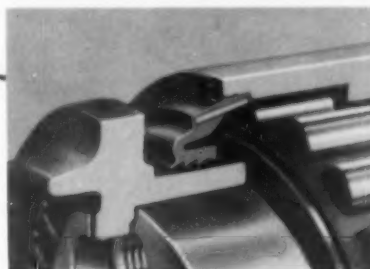
**OF ALL THE ROLLER BEARINGS
S. THIS NEW HY-ROLL BEARING
UNEQUALLED EXPERIENCE**



Large straight cylindrical rollers provide maximum load capacity and life; all parts interchangeable, no fitting adjustments



Lateral thrusts are easily and efficiently absorbed by generously proportioned race flanges against which rollers locate



Positive-type seals at both ends of the housing keep lubricant in, completely exclude dirt, water and foreign matter



Locking cup, bolted solidly to end of axle, retains unit and protects assembly. Clip positively prevents loosening of bolts

with high-capacity straight cylindrical rollers. This new HYATT HY-ROLL Bearing for freight cars employs the same time-tested principle—refined and simplified for minimum installation and maintenance costs in interchange use. Its basic features have already been proved in millions of miles of service. Check all these advantages of the HYATT HY-ROLL.



Both Built For THE "LONG HAUL"!

Roller Bearings on the GM "Aerotrain" were produced by the makers of the Hyatt Hy-Roll

GENERAL MOTORS designed the revolutionary high-speed, lightweight "Aerotrain" to provide *faster and smoother passenger service at far lower cost* than conventional equipment. It has HYATT Roller Bearings on every wheel.

Similarly, the new HYATT HY-ROLL Bearing is designed to provide *faster and smoother freight service at far lower "long haul" cost* than conventional friction bearings. Both the new train and the new bearing are products of GM's vast experience which has developed so many contributions to the "long haul" prosperity of the railroads.

ARE THE FREIGHT CARS YOU'RE BUYING TODAY
GOOD ENOUGH TO MEET TOMORROW'S COMPETITION?

A freight car, unlike a highway truck, isn't worn out and replaced every few years. The fleets of freight cars being built today will still be rolling 10, 15, or 20 years from now. Be sure to equip your new cars so that they will remain competitive for years to come.

REMEMBER:

tomorrow's profits
depend on foresight today—
call your nearby
Hyatt Sales Engineer NOW!



HYATT

HY-ROLL

BEARING FOR NON-STOP FREIGHT

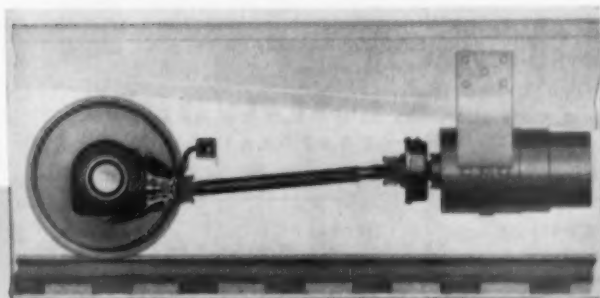


**When
the going is
tough..... snow and ice can't stop the
Spicer Railway Generator Drive!**

Look at the record of more than 11,000 Spicer Railway Generator Drives operating all over the world . . . under the world's most extreme weather conditions

. . . and you'll find a remarkable record of constant service!

The Spicer Drive, being of the positive type and fully protected, is not affected by ballast, dirt, snow, rain, ice, sleet, or hot or cold weather.



The Spicer Drive assures a high degree of efficiency at all times, and keeps batteries fully charged under the most adverse operating conditions.

The Spicer Drive has no belts or chains to slip or come off. No fuel mixture to be affected by changing altitude or atmospheric conditions. Nothing to jerk, jar, jam or get jimmied up.

Spicer case-hardened alloy steel gears and anti-friction bearings operate in a light oil, reducing friction and heat losses to a minimum. Power transmission losses are remarkably low.

Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs. Write for further details.

Spicer

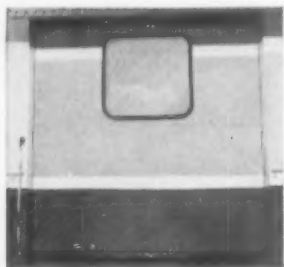
DANA CORPORATION

Toledo 1, Ohio

MET-L-WOOD METAL BONDED TO PLYWOOD DOORS

★ LIGHT...TOUGH...
DURABLE
★ NO THROUGH-BOLTS
NO WARPING
★ NO TWISTING
NO SWELLING

BAGGAGE AND POSTAL CAR DOORS



Completely weatherproof Met-L-Wood doors effectively prevent internal rust and rot...and their tough, smooth surfaces stay new-looking for years. Stainless steel channels along bottom edges of sliding doors are rustproof...virtually wearproof. All-rubber window sash installed or removed in minutes...rattleproof...water- and weatherproof. Available in full width and split types... sizes to meet all needs.



Exclusive Split Door Seal

Drawing above shows simple Met-L-Wood Split Door Seal which assures weather- and watertightness for years of continual use. Seal also provides effective cushion when closing split doors.

PASSENGER CAR END, VESTIBULE, INTERIOR DOORS

Sound-deadening, insulating, vibration-damping Met-L-Wood doors for passenger cars add to service life, cut deadweight... Combine modern, clean-line beauty with great strength and durability. Furnished for manual or automatic operation, with or without hardware assembly. Tapping plates for hardware are built into doors... invisible additions to strength and trouble-free service life. Sizes and types to fit all requirements... exact dimensions insure quick assembly and perfect fit. Door thicknesses from 1/2" up, as required.



CABOOSE DOORS

Met-L-Wood caboose doors are built to last the life of the caboose—and to give trouble-free service the whole time. Weather-proof, warp-proof, rot-proof doors can be provided with or without stationary windows in all-rubber sash or with standard drop sash. Available with or without hardware. In all sizes to exactly meet specifications.

DIESEL LOCOMOTIVE DOORS

Widely used by builders on new locomotives, Met-L-Wood doors guarantee trouble-free operation of end and interior doors on diesel road locomotives and cab doors for diesel switchers. Furnished to exact dimensions, with or without windows; either with hardware installed, or with tapping plates placed for hardware assembly on the job.



Write for this Bulletin

Met-L-Wood Bulletin 520 gives the complete, illustrated story on Met-L-Wood doors for railroad uses... shows construction details, describes standard and special types and sizes. Your copy sent free upon request—write for it today.



MET-L-WOOD
CORPORATION

6755 W. 65th Street
Chicago 38, Illinois

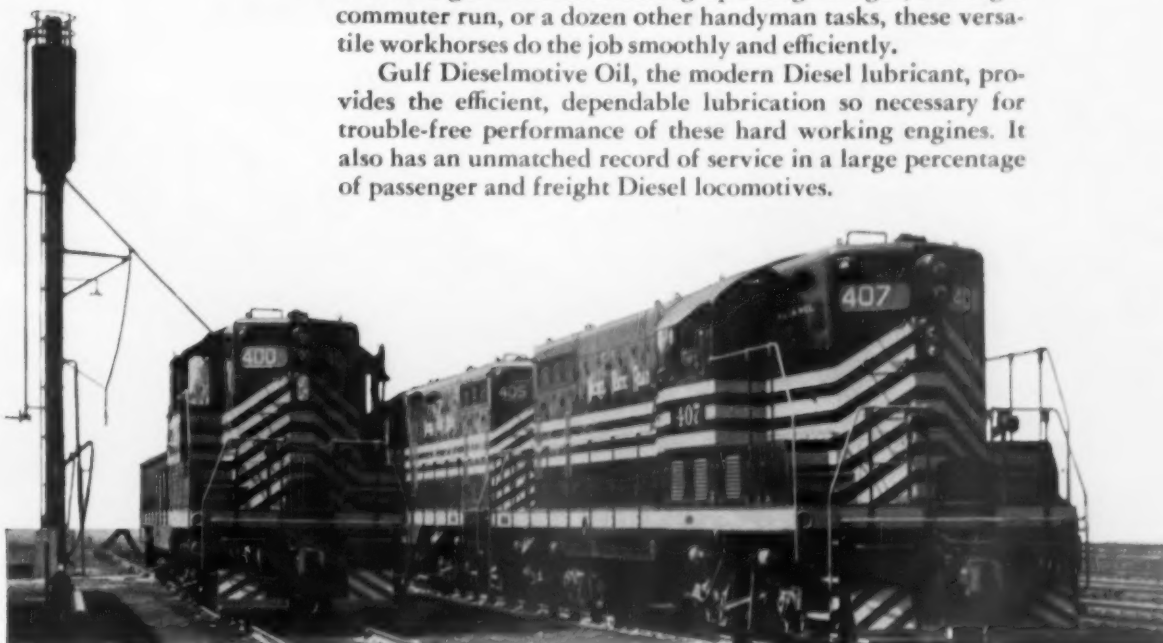
MET-L-WOOD • STRONG...LIGHT...Smooth Finish...Sound Deadening...Fire-Resisting...Insulating

for effective, efficient
lubrication of
Diesel switchers

GULF DIESELMOTIVE OIL

When the job calls for fast action and economy, Diesel switchers get the nod. Breaking up a large freight, making a commuter run, or a dozen other handyman tasks, these versatile workhorses do the job smoothly and efficiently.

Gulf Dieselmotive Oil, the modern Diesel lubricant, provides the efficient, dependable lubrication so necessary for trouble-free performance of these hard working engines. It also has an unmatched record of service in a large percentage of passenger and freight Diesel locomotives.



Here's how this top quality lubricant helps keep maintenance costs down, availability up:

1. Chosen for their ability to prevent hard carbon deposits in hot spots, the selected base stocks of Dieselmotive Oil also provide an oxidation resistance safety factor.
2. 100% solvent refining of base stocks (which removes undesirable constituents) guarantees greater stability and more effective bearing protection.
3. Superior additive response is obtained by carefully matching the additives to the base stocks. This insures clean rings, grooves, oil cooling passages, and a minimum of piston crown deposits.

Gulf Sales Engineers are always available to aid you in maintaining high standards of lubrication throughout your system. Write, wire, or phone your nearest Gulf office.



THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS


NEW

Revolutionary AIRengineering Development by Ingersoll-Rand...

TORSION BAR

Torque control **IMPACTOOL**

FOR HEAVY NUT RUNNING



Now it's easy to
meet torque re-
quirements with
greater speed and
accuracy!



MULTIPLE TORQUE SETTINGS
MAXIMUM TORQUE—550 FT. LBS.
SIZE 5340T

...how can YOU use these OUTSTANDING ADVANTAGES?



Torque can be quickly and easily set, using the jig as shown above. The torsion bar automatically shuts off the tool when the nut running resistance becomes equal to the stress preset in the torsion bar.

• Write, phone or wire for a free demonstration . . . or write direct for full information on this revolutionary AIR-engineering development.

- **POSITIVE TORQUE CONTROL**—a revolutionary use of a rugged steel torsion bar for precision control of torque—combined with the power and speed of the Impactool.
- **SIMPLE TORQUE SETTING**—torsion bar adjusting sleeve is clearly calibrated for changing torque with easy-to-use torque jig.
- **TORQUE SETTING REMAINS CONSTANT**—for any nut running condition until the adjustment is changed.
- **ELIMINATES SPECIAL TEST FACILITIES**
- **NO NEED FOR PRESSURE REGULATORS**—Impactool operates at full power and speed.
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Sept. 12th 1955 Railway Age in "Pensy proves its Plypacks" reports 1/5 the percentage of hot boxes for Plypak equipped cars.

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"Longer life is based on two factors: design of the friction control mechanism itself, and materials of construction."

"I'm familiar with the C-1 design that uses large wedges and low-stressed wedge springs located in the side frames. How about materials of construction?"

"Well first of all, the C-1 uses a cast-steel wedge of a special analysis and hardness. This, combined with full-width bearing in the side frame pocket, gives a "polishing" action without any scoring or gouging. The flat surface of the wedge bears against a hardened, spring steel wear plate welded to the bolster. The wear plate has a slightly lower hardness value than the wedge. And it's this hardness ratio that prolongs the life of the C-1 wedge."

"But how about wedge springs?"

"Since, in the C-1, the wedge spring bisects the wedge angle, less spring pressure is needed to operate the wedge. Low stress and low load rate, combined with a cold-wound, shot-peened spring, make a good maintenance picture. In fact, the C-1 wedges and wedge springs should last the life of the car."

"That all seems to add up. Can you back up that claim?"

"Sure. Now just take a look at these actual service records . . ."

"Now wait a minute. Mind if I call in some of my other men to listen to the C-1 story?"

AA-1075

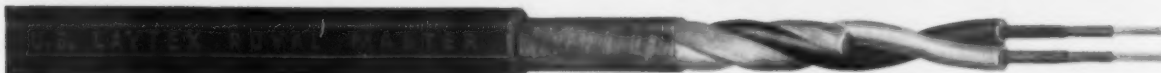
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Here are some of the requirements brushes must satisfy in traction motors, generators and auxiliary equipment on passenger-service locomotives . . . and why "National" brushes perform better and cost less than any other brand:

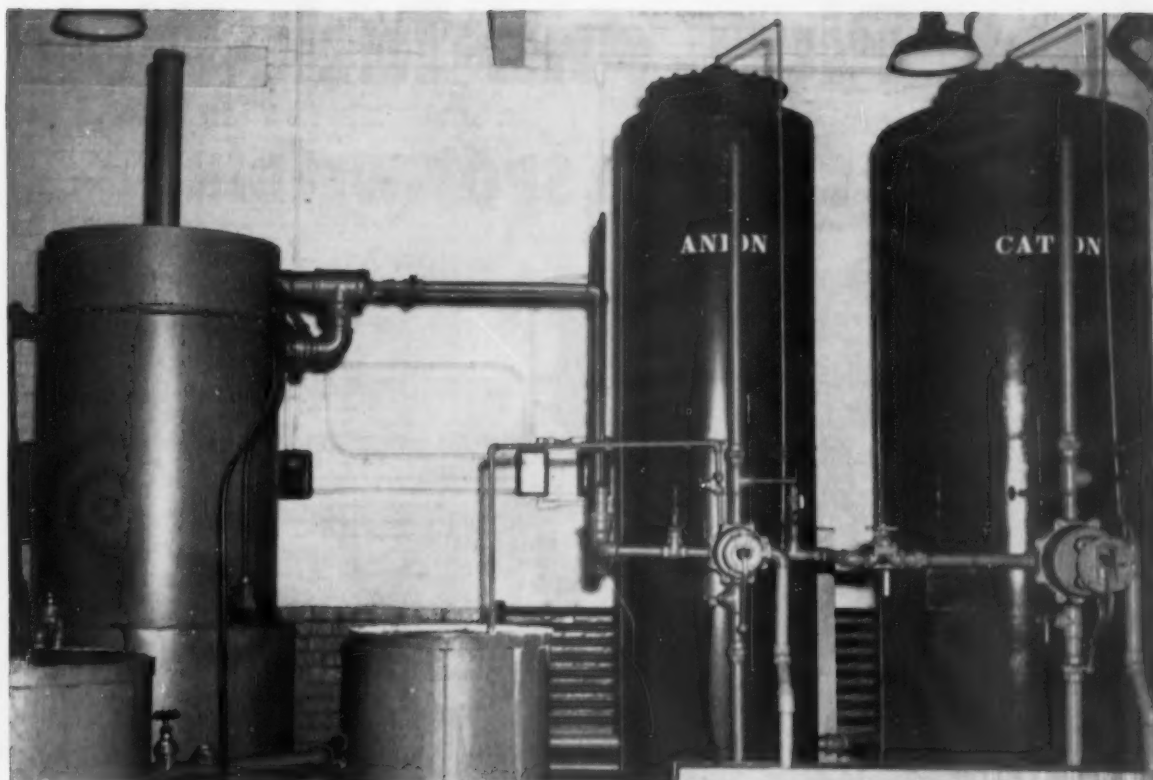
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4. **Improved commutator condition for minimum maintenance**—the superior film-forming properties of "National" brushes are the result of the most extensive brush-development program in the Railroad Industry.

Not only in passenger service but in *all* types of diesel-electric locomotive operation, "National" brushes deliver more for your brush dollar. Specify "National"—the brand proved by performance and used more than all other brands combined!

 **NATIONAL BRUSHES**

**Best For All Types Of Equipment . . .
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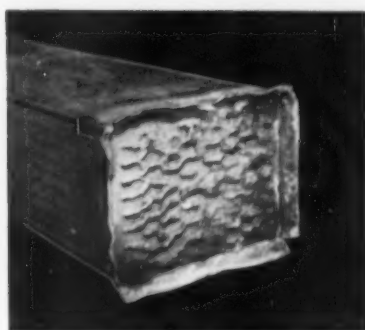
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Dearborn furnishes a complete line of De-Ionizing or Zeolite plants for railroad application.

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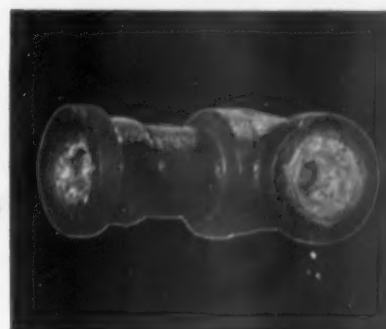
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Spot, Plug, and Tack-Weld

with the new **SIGMA SPOT-WELDING** process



- * Joins metals up to 1/4-in. thick
- * Adds filler metal automatically
- * Welds from one side of the joint
- * Shields weld area with inert argon gas
- * Operates on Constant Potential power supply

Spot, plug, and tack-weld with one torch. With sigma spot-welding you can make strong spot welds quickly on lapping metal sheets up to 1/4-in. thick, plug and tack-welds on metals up to 1/4-in. thick—and you need access to only one side of the weld joint. Use it on carbon, galvanized, or stainless steel, and copper-base alloys.

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the weld from the air. You can make up to 10 welds a minute, with a completely automatic welding cycle.

Constant Potential adds to efficiency. Sigma spot-welding equipment operates on constant potential power supply to give you the benefit of simplified controls, sure starting, and precise arc voltage. Weld-cratering and wire-sticking are eliminated. Welds are smooth and consistently uniform.

Your local LINDE representative will be pleased to give you booklet F-8778 and more detailed information on the sigma spot-welding process.

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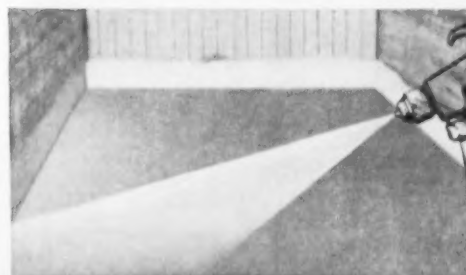
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AFTER



UPGRADES ANY CAR
INTERIOR TO MEET
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REQUIREMENTS

• **SMOOTH, TOUGH SURFACE**—EASILY SWEEPED OR WASHED OUT

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• **SOLVENT RESISTANT**—unaffected by mineral spirits, water or gasoline. Wood color of film will not stain or discolor

• **NON-HAZARDOUS**—an oil-in-water emulsion. Presents no fire hazard in storage or application.

• **INSECT RESISTANT**—made of synthetic resin and mineral fillers—absolutely impervious to insects.

A PROTECTIVE COATING FOR BOX CAR INTERIORS THAT LASTS INDEFINITELY



Here's really big news the whole railroad industry has been waiting for! Now, for the first time, it is possible to apply a quick, economical protective coating to box car floors and walls which insures the *permanent*, superior surface needed for shipment of high grade bulk commodities such as grits, flour, sugar and grain.

Armortex, an amazing new discovery of the J. W. Mortell Railroad Division, completely eliminates the costly preparation of cars for individual loadings. Internal car surfaces coated with Armortex no longer splinter or deteriorate under normal operating conditions . . . thus resulting in a reduction of claims due to leakage, infestations, package damage.

Still another big advantage of new Armortex is its ease of application. One man can cover a box car floor in less than 30 minutes . . . readying the car for service the next day. By spraying, brushing or troweling, Armortex can be applied at any shop, rip-track or siding without returning the car to a central maintenance location.

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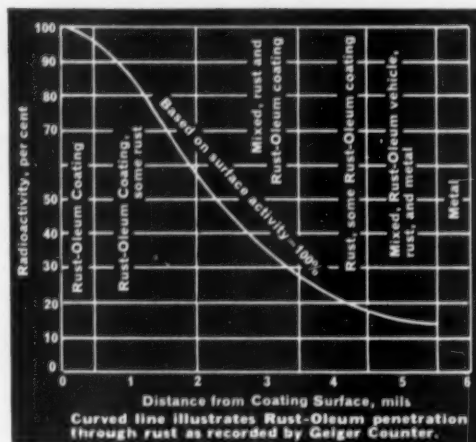
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RUST-OLEUM. PENETRATION

through rust to bare metal traced by Geiger Counter. To effectively stop rust—the vehicle of a protective coating, when applied over a sound, rusted surface—must penetrate through the rust down to bare metal. **Rust-Oleum does exactly that!**—as proved by radioactive research! Rust-Oleum's specially-processed fish oil vehicle was radio-activated and formulated into Rust-Oleum 769 Damp-Proof Red Primer—then applied to rusted test panels. Penetration through rust to bare metal by Rust-Oleum's specially-processed fish oil vehicle was then traced by Geiger Counter.

You stop rust, because Rust-Oleum's fish oil vehicle soaks deep down to bare metal and into the tiny pits where it drives out air and moisture that cause rust. You save, because this same penetration enables you to apply Rust-Oleum directly over rusted surfaces—usually eliminating costly surface preparations. Attach coupon to your letterhead for your thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists.



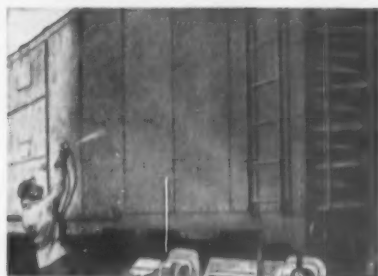
There is only one Rust-Oleum. It is distinctive as your own fingerprint. Accept no substitute. Buy—and specify only Rust-Oleum. You'll be happy that you did.



Rust-Oleum is available in practically all colors, including aluminum and white.

Your Rust-Oleum Railroad Rust Prevention Specialist will be happy to give you all the facts.

RUST-OLEUM®



STOPS RUST!

ATTACH TO YOUR LETTERHEAD—MAIL TODAY

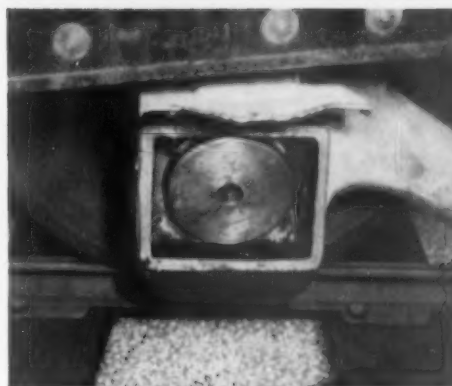
Rust-Oleum Corporation
2590 Oakton Street
Evanston, Illinois

- ☐ Complete literature including color charts.
- ☐ Thirty-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.



simple The "Redipak" lubricating pad is a square block of foam neoprene, molded with cored passages and covered with cotton wicking material. It is installed—without any other packing—in the standard journal box without jacking the box.

foolproof The square "Redipak" lubricating pad is fully symmetrical—it can be installed any side out, either face up. It can be inserted by hand or with a "Redipaker"—a simple bent rod which speeds up the work—and is removed with a standard packing hook.



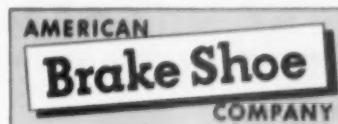
Stop Hot Boxes!

*"Redipak" Lubricating Pad points
the way towards elimination of the hot box problem*

cool-running The "Redipak" lubricated bearing has operated as much as 50°F. cooler than waste-lubricated bearings, under certain conditions. In laboratory starvation tests, with no free oil in the box, the "Redipak" retained enough oil for 10,000 miles of high speed operation.

long-lasting In service tests, "Redipak" lubricating pads have operated over 90,000 miles each, without noticeable wear. No pad has shown any sign of glazing. Inspection of the bearings shows that the pads do not lint.

No waste... with "Redipak"!

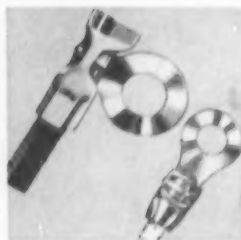


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**TERMINALS AND
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THEIR VALUE!**



AMP Plasti-Bond Terminals both ring tongue and flag were designed expressly for the railroad signal engineers.

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Hand and Power tools for speed, safety and sureness for applications using wire sizes up to 1 million circular mils.



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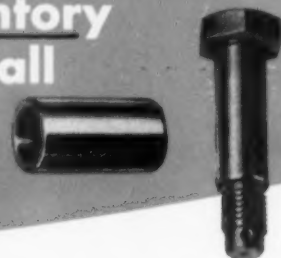
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can be small



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LOWER PRICES, whether you buy
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NOW...

400,000

CAR SETS!

Excuse us . . . please . . . our figures are showing again!

By December 31, 1955, our sales had passed the 400,000 mark. Actually, we now have sold 404,169 car sets of Barber Stabilized Trucks to more than 100 major railroads and private car lines in the United States and Canada.

We mention these new facts for *two* reasons:

- (1) There is no *better* way to convey to you the endorsement which the railroad industry has given our products; the leadership they have conferred on our company.
- (2) We're just plain *proud*! Standard Car Truck Co., 332 South Michigan Avenue, Chicago 4, Ill. In Canada: Consolidated Equipment Co., Ltd., Montreal 2.

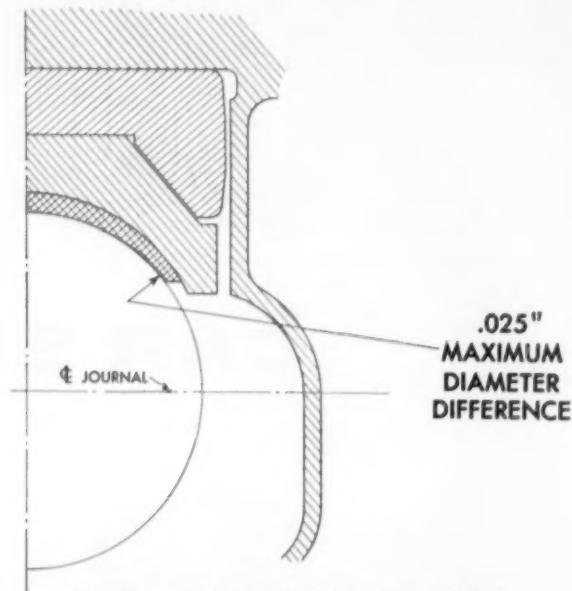
Specify Smoother-Riding

BARBER
STABILIZED TRUCKS

New AAR Standard

"CONTROLLED CLEARANCE" freight car bearings
in **FULL** and **STEP SIZES**
designed to make solid bearing performance
BETTER THAN EVER!

*New bearing designs,
developed by AAR and made
effective March 1, 1956, to
provide big extra margin of
safety during initial run-in
period by distributing
bearing load over wider area.
Step sizes for undersize
journals to increase
bearing efficiency
throughout life of axle.*



HOW NEW AAR BEARING FITS FULL SIZE JOURNALS—
Newly revised bore dimensions and tolerances, combined with journal tolerances, assure bearing clearance within .010" and .025". Old style bearing dimensions and tolerances permitted maximum clearance of 1/8" on full size journals and same bearing was applied to all undersize journals.

Now AAR solid bearings will get a chance to work at optimum efficiency almost as soon as they are installed. The reason: bore diameters and tolerances are greatly reduced. These new "controlled clearance" designs, combined with babbitt's high conformability, mean that you'll distribute the load evenly through the bearing crown after only a few miles operation. You'll get far greater bearing load capacity during initial operation.

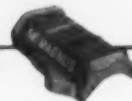
But that's not all. Now the AAR has two step size bearings (below nominal) for each standard size axle to accommodate turned down journals. Here's a big step toward the same high degree of bearing efficiency throughout the life of the axle.

Up to now the average solid bearing freight car has run 12 to 15 years per road failure of a bearing. Now you can look for that good record to improve—hot boxes to go down, miles per hot box to go up. Yes, you can expect still better solid bearing performance in the future—and at the lowest possible cost. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS
Solid Bearings

MAGNUS METAL CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**



service record of a ten year veteran

*the Lehigh Valley bought the first PS-1
Standardized Box Car 10 years ago*



With 1956 marking the Tenth Anniversary of the introduction of Standardization to the railroad industry, Pullman-Standard was certain that railroad personnel would be interested in a factual account of the performance and condition of the first of the standardized box cars.

The Grandfather of all Standardized Freight Cars—more than 100,000 of all types—was recently found hard at work. It was Lehigh Valley Box Car, LV-62000, the very first Standardized PS-1 Box Car ever built by Pullman-Standard. Ordered ten years ago, in 1946, the year Standardized Box Cars were introduced, LV-62000 was delivered to the Lehigh Valley in 1947. It has spent nearly nine years in hard general service, much of it off the Route of the Black Diamond.

Located far from home at Spaulding, Nebraska, the dean of PS-1s was found in excellent condition: it had just unloaded a cargo of shelled corn. Its condition, reported in accurate physical detail, is described in these pages.

Its condition and performance are testimonials to the equipment buying judgment of the Lehigh Valley and 75 other PS-1 using railroads throughout the Great American Railway System.



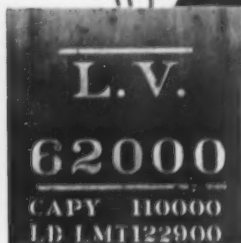
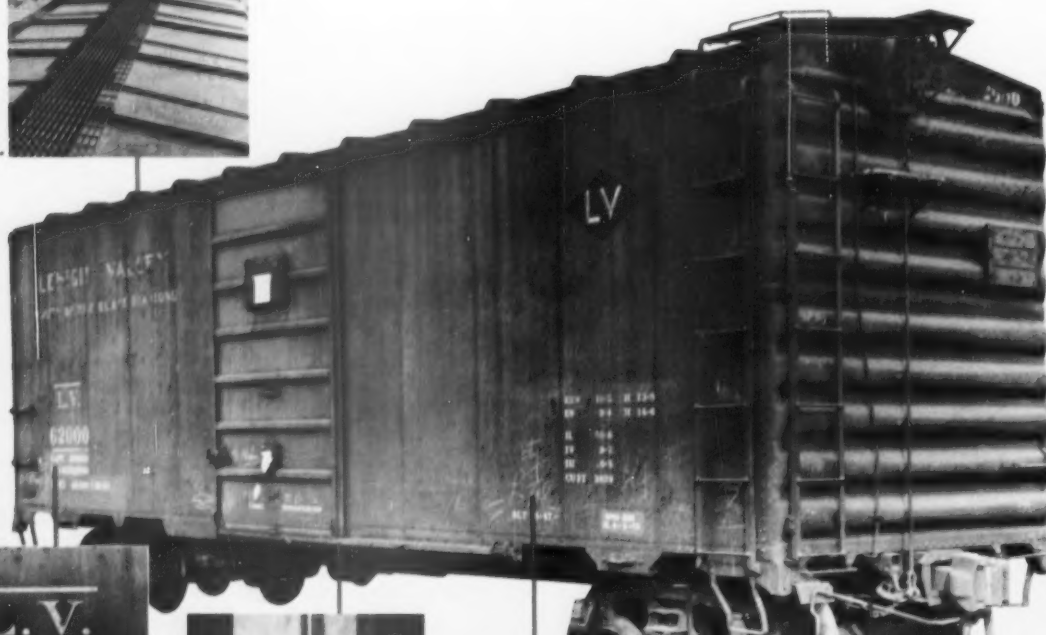


This is how the first PS-1 looked when delivered. Below is how it looks today.

the LEHIGH VALLEY...



1.



2.



3.



4.



5.



6.

1. LV-62000 was built with a Pullman-Standard welded roof. This roof was found to be in excellent condition, watertight, and without fractures in either the welding or the parent metal. The car cement was worn off about 90% of the roof surface, allowing mild corrosion. However, no measurable loss of metal had occurred. Anticorrosion coating on the roof underside was in good condition, adhering well to roof sheets.

2. THE FIRST PS-1 was found to have sides in excellent condition except where the original paint was missing in spots, allowing mild corrosion. Original paint was generally good, stencilling quite legible. Side sheets were sound and strong. Side sill, side plate, side posts and side sill reinforcement were all straight. There were no weld fractures at sills, side sheets at posts, side sills and side plates. With nearly a decade of hard service, the condition of LV-62000 is convincing evidence of the strength and performance of the PS-1 Side.

3. DOOR OPENINGS were square, with door posts straight. All welding was intact with no fractures in either side sills or side sill reinforcements. The 7-foot Superior doors were in relatively good condition. The lift handle on the left door was missing and there was slight bowing in the two door sections.

4. FLOORING (1 1/4") and lining (3/8"), were found to be in good condition. Flooring was worn and rough. But no floor boards were broken or showed signs of having been replaced. The flooring appeared to be the original installation, and was supported by two stringers on each side of sill. Later PS-1s use three stringers. No patching or replacement of end lining boards was distinguishable. Side lining was worn, and had been patched in a number of locations.

5. THE UNDERFRAME of LV-62000 was found in good condition

except for minor fractures of center filler web plates and center sill seam weld at bolsters. Side bearing clearances were ample at all four locations. At the time this car was built, AAR requirements of 30% center sill seam weld penetration were met. PS-1 specifications were subsequently changed, in 1950, to 100% penetration. 2000 PS-1 inspections since that time have revealed no underframe fractures such as found on LV-62000. This is an excellent example of how PS-1s are continually being improved although basic designs are standardized. (Pictured: Car cement scraped off for close inspection.)

6. THE ENDS of the first PS-1 were in excellent condition. The "B" end was bowed about 1 1/4" and the "A" end about 2 1/2," both in the lower section. End posts were not distorted, and ends could be easily realigned with an end straightener. Nearly a decade of hard general service by this car proves the strength and worth of the PS-1 end.

The present day excellent condition of LV-62000, the first PS-1, proves the value of standardization. Individual components have withstood weather, time and hard service. And since the segments work together in mutual support, the whole car is capable of top performance. This is the key to standardization: Properly designed, engineered, tested components integrated to provide a freight car capable of maximum strength, performance, dependability and economy.

number one investor in STANDARDIZATION

LEHIGH VALLEY PS-1 No. 62000 performance log of a typical year

1954

ROAD FROM	ROAD TO	DATE
Chesapeake & Ohio	Lehigh Valley	1/1
Lehigh Valley	Genesee & Wyoming	1/4
Genesee & Wyoming	Lehigh Valley	1/5
Lehigh Valley	New York Central	1/6
New York Central	Niagara Junction	1/6
Niagara Junction	New York Central	1/8
New York Central	Lehigh Valley	1/9
Lehigh Valley	Genesee & Wyoming	1/12
Genesee & Wyoming	Lehigh Valley	1/14
Lehigh Valley	New York, Ontario & Western	1/16
New York, Ontario & Western	New York, New Haven & Hartford	1/17
New York, New Haven & Hartford	Boston & Maine	1/22
Boston & Maine	Delaware & Hudson	1/30
Delaware & Hudson	Lehigh Valley	2/1
Lehigh Valley	Genesee & Wyoming	2/10
Genesee & Wyoming	Lehigh Valley	2/11
Lehigh Valley	Delaware & Hudson	2/12
Delaware & Hudson	Boston & Maine	2/13
Boston & Maine	Delaware & Hudson	2/19
Delaware & Hudson	Lehigh Valley	2/22
Lehigh Valley	Genesee & Wyoming	3/3
Genesee & Wyoming	Lehigh Valley	3/5
Lehigh Valley	New York Central	3/6
New York Central	Niagara Junction	3/6
Niagara Junction	New York Central	3/12
New York Central	Indiana Harbor Belt	3/15
Indiana Harbor Belt	Chicago, Milwaukee, St. Paul & Pacific	3/15
Chicago, Milwaukee, St. Paul & Pacific	Union Pacific	3/17
Union Pacific	Southern Pacific	4/9
Southern Pacific	Western Pacific	4/13
Western Pacific	Southern Pacific	4/15
Southern Pacific	Spokane, Portland & Seattle	4/19
Spokane, Portland & Seattle	Union Pacific	4/20
Union Pacific	Spokane, Portland & Seattle	5/1
Spokane, Portland & Seattle	Great Northern	5/1
Great Northern	Western Pacific	5/2
Western Pacific	Atchison, Topeka & Santa Fe	5/3
Atchison, Topeka & Santa Fe	Belt Railway of Chicago	5/21
Belt Railway of Chicago	Chicago, South Shore & South Bend	5/21
Chicago, South Shore & South Bend	New York Central	5/22
New York Central	Lehigh Valley	5/31
Lehigh Valley	Buffalo Creek	6/9
Buffalo Creek	Lehigh Valley	6/10
Lehigh Valley	New York, New Haven & Hartford	6/20
New York, New Haven & Hartford	Boston & Maine	6/21
Boston & Maine	Delaware & Hudson	7/9
Delaware & Hudson	Erie	7/9
Erie	New York Central	7/10
New York Central	Niagara Junction	7/24
Niagara Junction	New York Central	7/30
New York Central	Chicago River & Indiana	8/1
Chicago River & Indiana	Chicago Burlington & Quincy	8/5
Chicago Burlington & Quincy	Chicago, Minneapolis, St. Paul & Pacific	8/30
Chicago, Minneapolis, St. Paul & Pacific	Indiana Harbor Belt	9/24
Indiana Harbor Belt	Chesapeake & Ohio	9/25
Chesapeake & Ohio	Lehigh Valley	9/27
Lehigh Valley	Pennsylvania Railroad	10/25
Pennsylvania Railroad	Lehigh Valley	10/27
Lehigh Valley	Buffalo Creek	11/24
Buffalo Creek	Lehigh Valley	11/26
Lehigh Valley	Wabash	12/21
Wabash	Union Pacific	12/23

LEHIGH VALLEY box car LV-62000 was the first PS-1 Standardized Box Car to be ordered. Its history, therefore, from ordering to the present time covers the years 1946 to 1956. The Lehigh Valley took delivery in 1947, so its actual service extends through about nine years.

The log at the left covers only 1954, but is typical of a year's service by LV-62000. During that year, as in the others, the car spent much time in interchange, and was off the Lehigh Valley for 238 days. This compares with 298 days in 1949, 365 days in 1950, 361 days in 1951, 302 days in 1953. Year-by-year, LV-62000 covered the country from top to bottom, coast to coast, and was subjected to all the hard demands of weather and operating conditions on the Great American Railway System.

It was obvious to Pullman-Standard years ago that for the railroads to maintain their position as leader in American transportation, they would need rolling stock that helped them outdistance competition. Such rolling stock would have to break tradition with customization and be standardized. Through standardization freight cars could receive all the advantages of mass production techniques, costly jigs and fixtures for precision fabrication, advanced building methods such as special welding, laboratory testing, and field surveillance. In addition, continuous study by freight car engineers would allow improvements in the flexible standardized designs, in keeping with changing railroad requirements. And standardization would bring important savings in first cost and reduced maintenance—prime considerations to cost-conscious railroads.

The box car was chosen as the first freight car to be standardized. Pullman-Standard's entire organization drew on its skills, experience and facilities to create the standardized box car... designated as the PS-1.

The forward-thinking Lehigh Valley, The Route of the Black Diamond, quick to appreciate the many benefits of standardization, was the first to order a PS-1, which they in turn designated LV-62000.

Today the Lehigh Valley is serving its shippers and consignees with an expanded fleet of PS-1 Box Cars. Lehigh Valley Operating Officials have expressed extreme satisfaction with the performance of these cars.

Today LV-62000 has over 75,000 PS-1 descendants on order or giving dependable, economical, service on 75 railroads of the Great American Railway System.

With standardization an obvious success, Pullman-Standard has added three more standardized freight cars to its line. They are the PS-2 Covered Hopper Car, PS-3 Hopper Car, and PS-4 Flat Car. Each, in its way, offers the railroad industry rolling stock benefits and performance comparable to those of the PS-1.



WORLD'S LARGEST MANUFACTURER OF PASSENGER AND FREIGHT CARS

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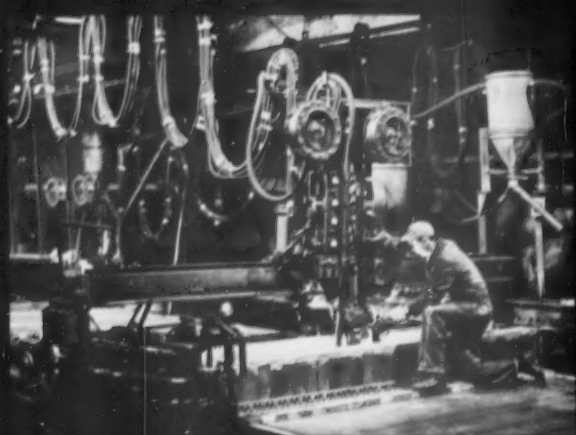
CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

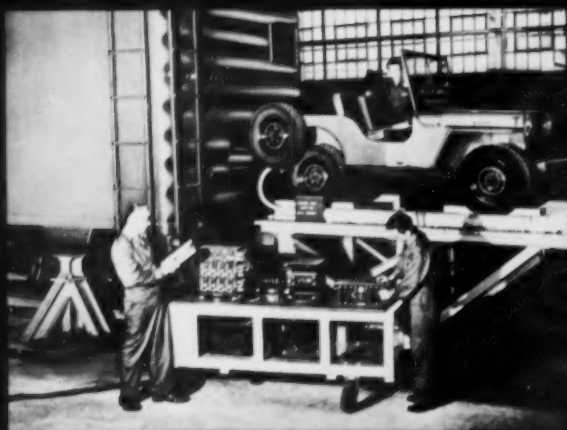
75 EAST ADAMS STREET, CHICAGO 3, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

how the first PS-1 was built



Pullman-Standard utilizes many unique and highly advanced welding methods on standardized freight cars. Specially designed automatic welding machines, the only ones of their kind, supplement precision down-hand welding.



Pullman-Standard maintains the carbuilding industry's largest Research and Development Laboratory. Products, materials and procedures are subjected to exhaustive tests and scientific study in a constant search for improvements.

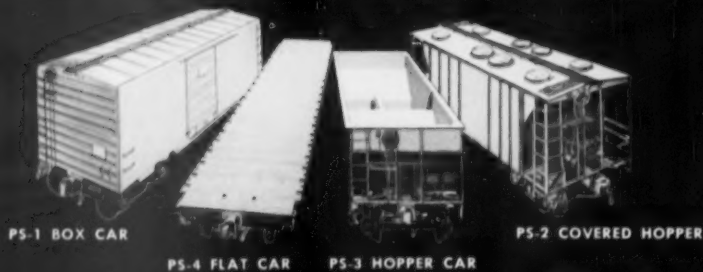


Mass production techniques permit standardized freight cars to be precision built with costly dies, jigs and fixtures impossible for custom cars. Better cars, better performance and lower costs are the result.



Trained Field Service Engineers travel over 100,000 miles yearly inspecting cars built by Pullman-Standard and other carbuilders. These inspections factually record data that sometimes leads to design improvements.

Built to serve best on the
GREAT AMERICAN RAILWAY SYSTEM



WORLD'S LARGEST MANUFACTURER OF PASSENGER AND FREIGHT CARS

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BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

Our New Publisher



Robert G. Lewis

In a continuation and intensification of its expanding publication service to the railroad industry, Simmons-Boardman Publishing Corporation has named Robert G. Lewis—heretofore the company's director of circulation—as publisher of *Railway Age* and its other railway magazines. Robert C. Van Ness, Mr. Lewis' assistant in the circulation department, has been named acting director of circulation. In announcing Mr. Lewis' appointment, James G. Lyne, company president and editor of *Railway Age*, said:

"There is no other industry, we believe, which is served as intensively by its industry press as railroads are by Simmons-Boardman. In addition to our weekly, *Railway Age*, now in its 100th year of service we have the specialized monthly publications—*Railway Locomotives and Cars*, *Railway Track and Structures*, *Railway Signaling and Communications*, and *Railway Freight Traffic*. Each of these papers is pin-pointed to an important specialized audience within the indus-

try. We are now about to begin a quarterly publication, in Spanish, *Selecciones del Railway Age*, to introduce and publicize North American railway standards and practices, primarily in Latin America."

Mr. Lewis, in addition to his career in circulation work with Simmons-Boardman, also has a background of editorial experience, having been a *Railway Age* editor before he transferred to circulation in 1950. A Philadelphian, 39 years of age, Mr. Lewis began his business life as a railroad man. He had 12 years of service with the Pennsylvania, in the personnel, transportation, and freight traffic departments—and in the purchasing and wage schedules departments of the Bessemer & Lake Erie—before joining Simmons-Boardman in 1947. He served four years with the U. S. Naval Reserve, during and immediately after World War II; and is a past president of the National Circulation Round Table of Associated Business Publications, Inc.



MANY LEADING RAILROADS are now using No. 2 fuel oils stabilized with Du Pont FOA-2 with excellent results.

Du Pont *diesel fuel additive* offers greater operating economies

You may now find it practical to expand your choice of diesel fuels by considering a wider and more economical variety of blends of cat-cracked, thermal-cracked and straight-run stocks. The benefits of this "economy grade" approach can be obtained by using fuels containing Du Pont FOA-2.

Du Pont FOA-2 is an ashless, non-metallic antioxidant and dispersant that permits you to operate diesel locomotives on many economical combinations of cracked and straight-run fuels.

Good filterability—non-sparking

In addition, the dispersant action of FOA-2 helps to end most filter plugging problems and does not contribute

to exhaust stack sparking because it is both non-metallic and ashless.

High temperature use

Besides good storage stability, field trials and commercial experience show that fuels containing FOA-2 protect against harmful residues and are excellent in injectors under high temperature use.

Costs little

Only small amounts of FOA-2 are needed to obtain required stability. Furthermore, FOA-2 added to freshly

prepared stocks necessitates no special equipment for your fuel supplier.

For information . . .

Just call or write us if you would like to know more about Du Pont FOA-2 and how it can give you operating as well as economic advantages.



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EDITORIALS

What Is The Answer?

At a recent meeting of the Northwest Carmen's Association, the subject of passenger car maintenance, largely from a terminal standpoint, was discussed and the difficulty cited of developing and training terminal car forces fast enough to keep up with the increased complication of passenger car equipment, both mechanical and electrical. As one supervisor put it:

"The modernization of passenger trains, during the last decade, and the rapidity with which these trains are being further modernized, outdistance the skill and competence of personnel whose task is maintenance. Is this not a problem that must be met? Is it not a problem that suggests establishment of some system of education and training of personnel, particularly at major terminals? Certainly, it is not a problem that can be solved in the old way; namely, trust that in some way, somehow, the crew supervisor will be able to educate, train and direct the subordinate in all his functions.

"The modern train represents the ultimate in electric generation, illumination, refrigeration, air-conditioning, brakes, running gear, car furnishings, and equipment generally. Does the situation not call for vocational education and training in the techniques of servicing and maintaining these trains mechanically; particularly at major terminals and shops? Should not vocational clinics or places of study be established at such locations as well afford personnel the opportunity to review manufacturers' text books, diagrams, catalogs; also management's published instructions, standards and practices; as well as literature generally that is pertinent to passenger train maintenance."

One solution from a long-range standpoint which comes

to mind immediately is to strengthen the car side of apprentice training courses; utilize the best brains and experience available in assembling the information which needs to be taught; and finding some better means than now used for attracting and encouraging car apprentices who show promise of making good mechanics, electricians, lead men and supervisors in the passenger-car field.

Another move which brings more prompt results is the fullest practicable use of manufacturers' experience and capacity to instruct local car forces. In one instance, cited at the meeting, an itinerary was set up for qualified representatives of a brake manufacturer to visit all principal points on the line with descriptive data and working models, answer questions and demonstrate how this particular equipment can best be used and repaired. Similar help was accorded by a car heating company and a mechanical refrigeration manufacturer. In the latter case, an instruction car was fitted up with visual aids and sent over the road to show men how to check, inspect and maintain the equipment.

This type of instruction is doubtless extremely valuable but how far can it be carried? Obviously, it is neither practicable or desirable for each supply company to have an instructor on each railroad, either simultaneously or staggered through the year. A better plan is for key men from different railroads to take courses at manufacturers' plants and this is being done with notable success in a number of cases.

The local vocational clinic or school seems to hold more promise of reaching a larger number of passenger-car men quickly, however. Do you agree, or have you a better idea?

D-C Hi-Potting

Direct-current high-potential testing appears to offer a number of advantages to the operators of diesel-electric locomotives. The electrical equipment on these locomotives is subjected to severe vibration, and is exposed to moisture, oil and dirt. The amount of exposure is not constant and as a result insulation resistance may vary with circumstances immediately preceding a test.

Standard a-c hi-potting makes no compromise, and includes no means of predetermining what may be a temporary condition of the insulation. It was conceived for the purpose of testing new insulation and in many cases has broken down insulation which could have been made good by the simple process of drying out moisture.

Direct-current testing offers two inherent advantages. First, it may be used to anticipate failure, and, second, if test records are kept, it may conceivably

provide a means of predetermining the ultimate life of insulation.

There is nothing in the I.C.C. rules prohibiting the use of d-c for high-voltage testing, but to substitute d-c for a-c without any change may be a mistake. The a-c, with its wave top voltages, as compared to root mean square voltage, and with its oscillating forces produces a more rugged test than the same d-c voltage as shown on a meter. It would appear therefore that if the d-c method is to provide a completely adequate test which will insure against failure in service the test voltages used should be respectively something more than 75 per cent and 50 per cent of normal working voltage. And the value of such a voltage should not be set arbitrarily, but should be developed by further study of this apparently valuable new tool.

A new line of Milling Machines

for production shops . . .

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The new Powermatics are medium-size production type millers with a powerful spindle drive . . . actually 200% more power than the previous design. 7½ hp cuts are just routine performance. And because of the many setup conveniences, you can get going fast! Change-over time from one job to the next is comparable to many knee-type millers. Just consider the cost-reducing possibilities of these Powermatic features:

Automatic two-way table cycles; reversible through a selector knob

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functions; can be interchanged in a minute or two

Single lever table control; for starting automatic cycles . . . for manual control when setting up the job

Automatic backlash eliminator; adds down-milling and reciprocal milling to Powermatic versatility

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Three styles: Plain, Duplex, Plain Rise and Fall

Of course, there are many additional ways in which the new CINCINNATI Powermatics can help you produce more at a lower cost. You can't afford to overlook these fine new CINCINNATIS. Ask for catalog No. M-1913.

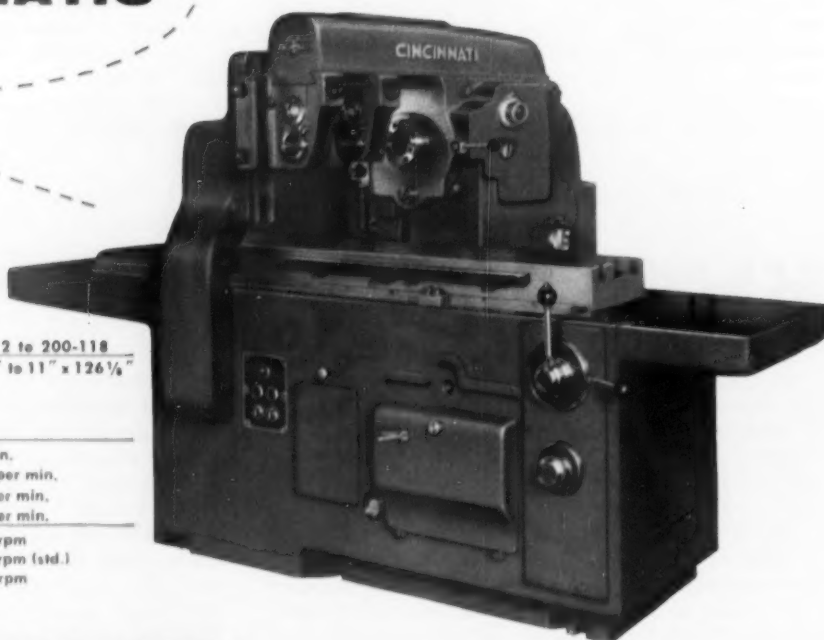
THE CINCINNATI MILLING MACHINE CO.
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Plain Rise And Fall POWERMATIC



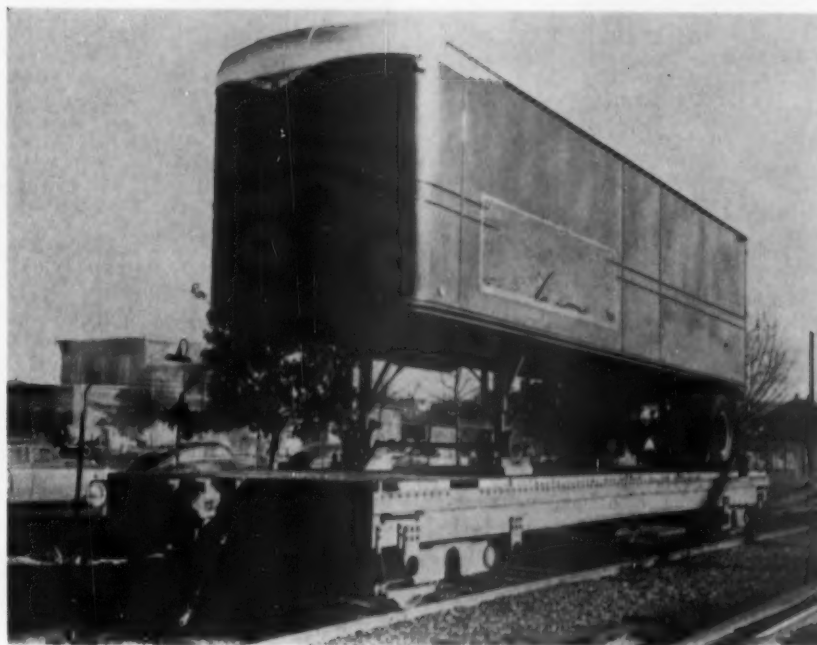
BRIEF SPECS.

seven sizes	nos. 200-112 to 200-118
table working surface	11" x 55½" to 11" x 126¼"
range: table travel	24" to 96"
spindle carrier	8"
quill (cross)	3"
table rapid traverse	300" per min.
16 table feeds: std.	½" to 20" per min.
high series A	1" to 40" per min.
high series B	2" to 80" per min.
16 spindle speeds	30-1200 rpm
	50-2000 rpm (std.)
	75-3000 rpm



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OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID



ACF Adapto—Four-Wheeled Versatility

Rock Island is getting first models of new ACF line. Removable bodies can produce box, tank, hopper, and refrigerator cars over basic flat car underframe.

ACF is producing for the Rock Island an order of freight cars which depart as radically from accepted freight standards as the low-slung passenger trains have varied from accepted passenger car standards. Fifty of these four-wheel, 35-ft flat cars are to be delivered by mid-year. The Adapto, ACF's name for this new development, is being offered as a basic unit which can be fitted with a variety of removable bodies for service as a box, tank, gondola, or refrigerator car.

The 35-ft by 9-ft platform is carried on two axles spaced to give the car a 26-ft wheel base. It is equipped with Type F couplers, rubber draft gears, roller bearings and 33-in. wheels. Each wheel is equipped with its own brake cylinder operating a composition brake shoe. The

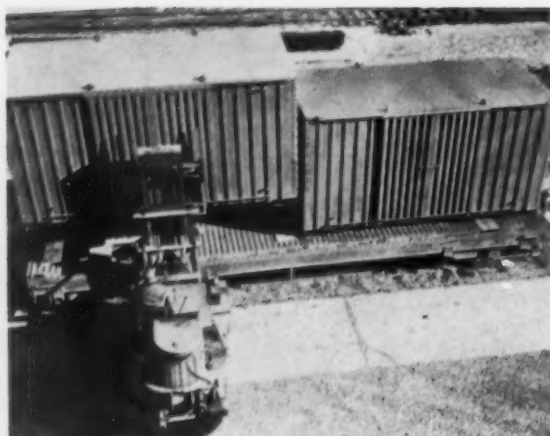
body is supported on four air cushions over each axle. Valves regulate the air supply to these air springs so that the car is automatically leveled regardless of the load. There are also four swing hangers providing a pendulum suspension over each two-wheel truck. Two shock absorbers damp the vertical and lateral shocks.

The platform is constructed of removable wooden members placed on edge and spaced so that the surface will be self-cleaning. This construction is designed to reduce platform repairs and is expected to outwear ordinary floor construction. The platform is equipped to accommodate the various attachable load units which are to make the car convertible into the various freight car types.

The car weighs approximately 23,000 lb and has a



▲ Box car service can be provided with two of the Adapto box containers on the platform. Transfer of the Adapto containers can be done with fork lift trucks or overhead cranes.



capacity of 70,000 lb. ACF points out that this give the Adapto a weight less than one-half that of a conventional 52-ft flat car, and yet the capacity is approximately 70 per cent as great. The car will handle a load three times as great as its light weight. This compares with the two-to-one ratio attained with much standard American rolling stock.

The all-in-one design lends itself to box, container-hopper, gondola, tank, hopper, caboose and piggy-back service. This is achieved by the interchange of removable superstructures on the car's platform. In addition to the Adapto flat car, ACF will supply the containers, tanks, gondolas, hoppers and other superstructures so that the railroads will have them available at terminals for quick conversion to suit a shipper's requirements. It is pre-

dicted that the removable body will eliminate much empty car mileage. The Rock Island cars have been ordered with the box-compartment bodies. Rock Island president D. B. Jenks indicated that one of the first of these cars to come to that road will be tested as a baggage trailer behind a Budd RDC car.

Box car type containers will be available in 17-ft and 8-ft lengths for loading two or four to a car. Refrigerator containers, tanks and gondolas have been designed for loading two to each car. All of these containers can be handled with overhead cranes or fork lift trucks. An important application will be the use of the basic Adapto flat in piggy-back service. It will be capable of handling highway trailers up to 35-ft in length. Trailer Train Company has ordered 1,000 Adaptos for such use.

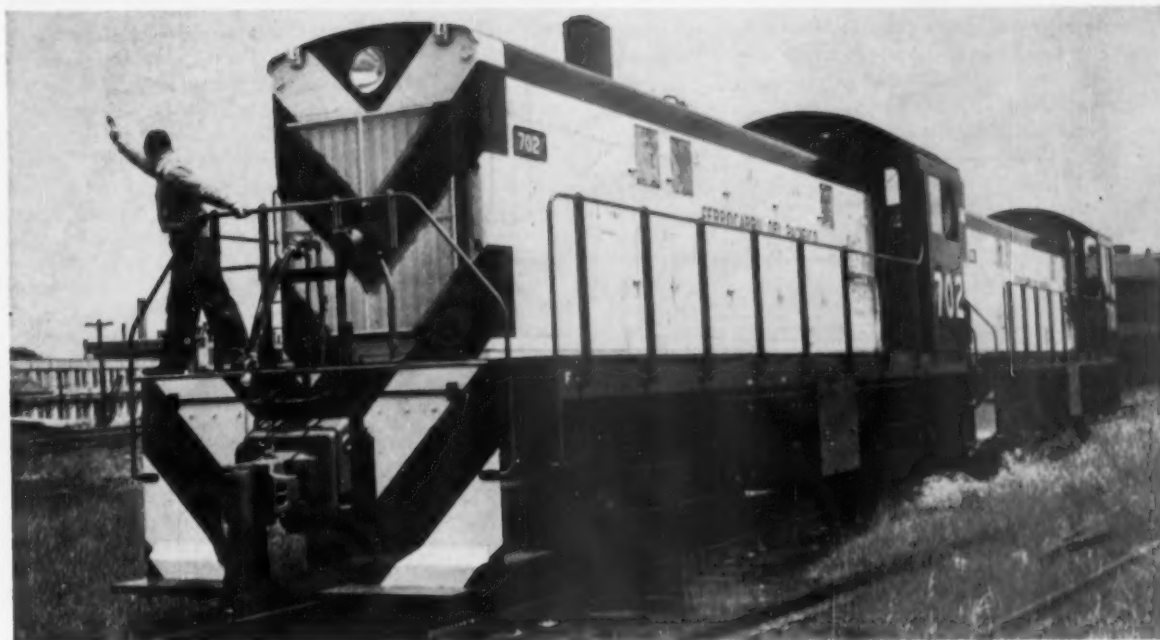


Four Wheel Cars

Four-wheel cars are a novelty on the current American scene. They are an accepted fact on European railroads. The earliest American cars had only four wheels. Coal and ore cars of this type continued in service until the turn of the century. Today only scale test cars and a few four wheel cabooses survive. The most recently built revenue service equipment was the Hormel refrigerator car constructed in 1932. These cars were in service for only a short time. Cars built prior to the Adapto had a much shorter wheel base than is used on this new ACF design.

Italian State Railways car (above left).

Hormel refrigerator car (left).



New 900 Hp Engine Powers Alco Switcher

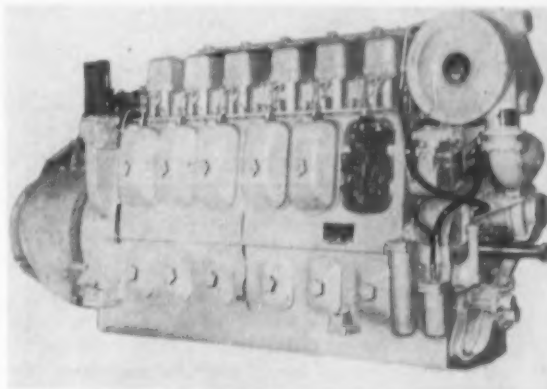
Alco has announced a new diesel-electric switching locomotive called the Model DL-430, a four-motor unit powered with a newly designed Model 251, six-cylinder, in-line Alco diesel engine developing 900 hp for traction. This new locomotive with a base weight of 230,000 lb on driving wheels and 60 mph gearing has a 46,000-lb continuous tractive force rating at 20 per cent adhesion. The 4-min rating is 71,700 lb at 31 per cent adhesion. The maximum height of the Model DL-430 is 14 ft 8 in., the maximum width is 10 ft ½ in., and the length inside coupler knuckles is 45 ft 5¾ in. The locomotive has the conventional switcher hood and cab, and runs on two four-wheel, two-motor trucks with 40-in. diameter wheels. It is designed primarily for yard service, and can do low-speed switching, or fast, light switching and transfer work.

Alco 251 In-Line Engine

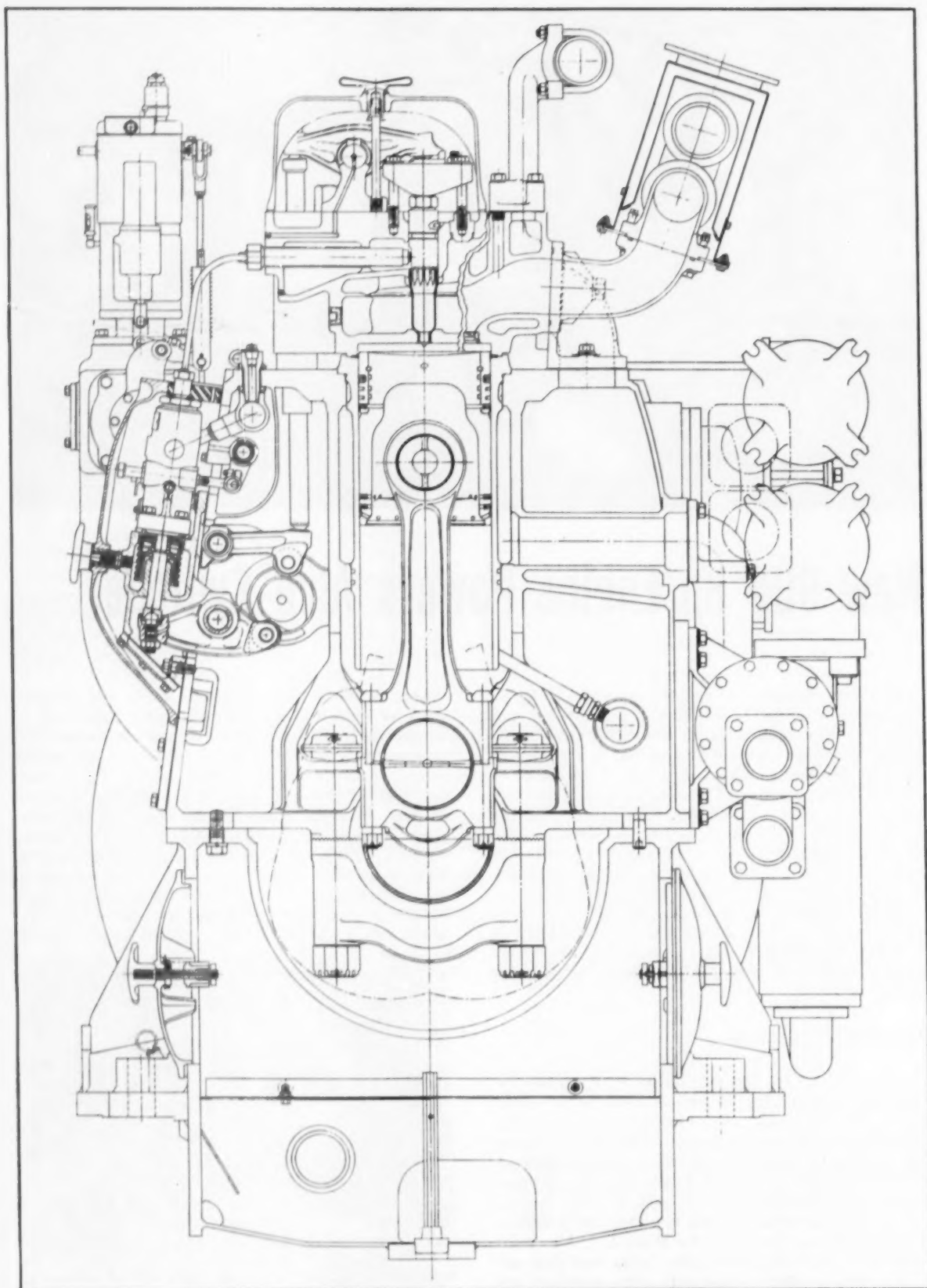
Power for the DL-430 is furnished by the newly designed Alco Model 251 four-stroke cycle, in-line diesel engine. The six-cylinder engine has 9-in. bore and 10½-in. stroke and develops full load at 1,000 rpm. The engine incorporates the experience gained in the development of both the Alco series 244 V-type, 9-in. by 10½-in. engine, and series 539 in-line 12½-in. by 13-in. engine.

One of the outstanding features of the new engine is its simplified construction. In the Model 251, Alco engineers have eliminated the water jacket and free-end casing, among other components, thus assuring less engine maintenance and repairs. The lubricating oil

system, including filters, strainers, cooler and pressure regulator which is built integral with the engine and is mounted on the cylinder block, is also a new feature. The arrangement eliminates external lubricating oil piping normally found on the locomotive chassis. The positive displacement, gear-type lubricating oil pump is driven by gears from the crankshaft. All engine jacket water passes through the lubricating-oil cooler. Two waste-packed type lubricating-oil filters are arranged so that some oil is filtered at all times the engine is running regardless of speed or load. A fine-mesh lubricating-oil strainer of the screen basket type is included to strain lubricating-oil just before delivery to the engine. A low



Redesigned bearings, new fuel injection equipment and a change in valve and fuel pump drive mechanism have been included in the Alco 6-cylinder in-line diesel.



251 engine fuel pumps are mounted on supports at side of the individual cylinders.

lubricating-oil pressure shut-down switch is mounted on the engine and operates through the governor to shut down the engine.

Alco's 251 engine utilizes a grooveless wide-center main bearing, and partially grooved connecting rod bearings. This feature provides a thicker and more uniform lubricating oil film during operation.

The cylinder block is fabricated steel with forged main-bearing saddles and serrated main-bearing caps. The block provides the water jacket for cylinder liners. Individual jacket sleeves are not used. The base, which also serves as the oil sump, is fabricated steel and is provided with four mounting pads for bolting to the locomotive underframe.

The crankshaft is one-piece forged and hardened steel, counter-weighted and with seven main bearings. Connecting rods are drop-forged steel, with precision type crankpin shells and piston-pin bushings. The two-piece oil-cooled aluminum piston with a Ni-Resist insert in the No. 1 compression ring groove is designed for long ring and ring-land life. Nickel cast-iron cylinder heads with two intake and two exhaust valves are equipped with valve seat inserts and special valves for longer valve and head life.

Water-Cooled Turbosupercharger

The engine is turbosupercharged with an Alco Model 320 water-cooled turbosupercharger which has fewer and more simple parts than turbosuperchargers formerly used with Alco's 1,000-hp yard switcher. It is unusually quiet in operation, and assures good engine combustion. A gear-driven centrifugal pump circulates water through the engine, radiators and lubricating-oil cooler. The capacity of the cooling system is such as to keep the oil and water temperatures at conservative figures even at high ambient temperatures. The engine is equipped with an after cooler for cooling engine air after it leaves the turbocharger. This is to improve performance and life of components by lowering the overall operating temperatures of the engine parts subjected to high temperature.

The locomotive's horizontal mounted radiators allow use of a cooling-water system with a capacity of only 110 gal. In cold weather, this permits fast warm-up. Radiator cooling is produced by a radiator fan which rotates in a vertical plane and is belt driven from the engine. Engine intake air is ducted from car-body filters and silencers direct to the water-cooled turbosupercharger air intake. A crankshaft extension is used on the free end of the engine for the connection through a coupling to the air compressor and radiator fan. The crankcase exhaust, driven by an electric motor, is a centrifugal blower mounted on the generator end of the engine which exhausts crankcase vapors to the atmosphere.

The governor is of the electro-hydraulic type. The independent mechanical overspeed trip automatically stops the engine in the event it overspeeds and provides manual shutdown. Individual fuel injection pumps are mounted adjacent to each cylinder and are completely enclosed. A primary fuel filter of the waste-packed type and a secondary fuel filter of the paper disc type are mounted on the engine. Failure of any part of the pump-injection tube or nozzle connection cannot produce dilution since the system is entirely separate from the lubricating system. The fuel tank holds 635 gal.

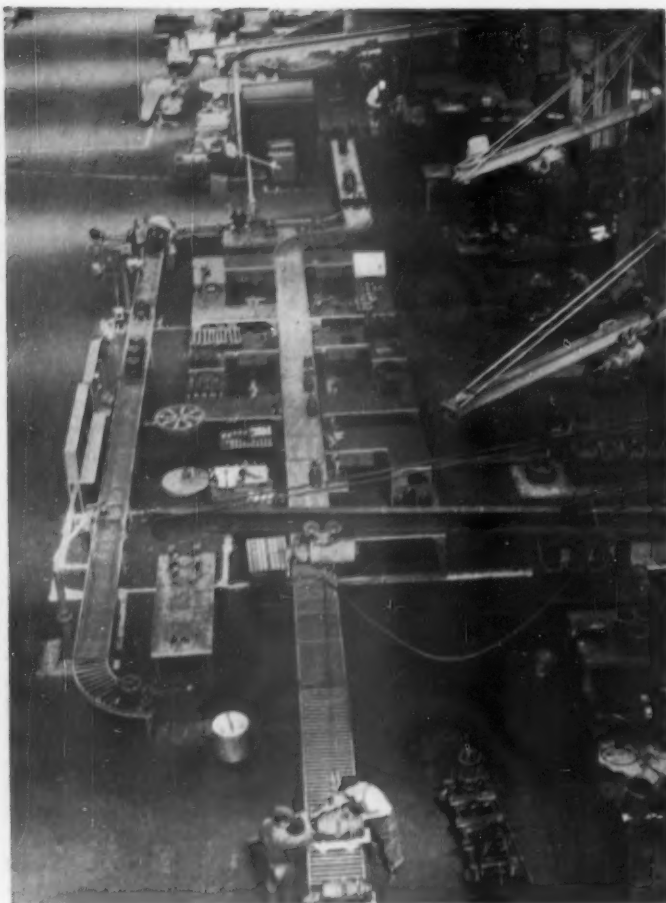
The four-wheel trucks have two motors and are built with dropped equalizers, and modified swivel-pedestal. Long equalizers and deep-deflection springs were chosen to give smooth riding at speeds greater than yard operation. The truck incorporates a parallel spring suspension system consisting of two helical spring assemblies, and one semi-elliptic spring on each side.

The Model GT 584 main generator offers increased current capacity enabling traction motors to utilize engine horsepower over a wide range of speed. A field shunt feature is available as a modification to produce full utilization over a wider speed range. The main generator contains both main and starting windings and is mounted directly on the end of the diesel engine, requiring only one generator armature bearing. Main generator excitation current is supplied by a splitpole exciter which receives its excitation directly from the battery and control circuits. This system is designed for simplified maintenance and dependability. The exciter and auxiliary generator are combined into one unit and are belt driven from the main generator shaft. The 7.5-kw auxiliary generator supplies power for battery charging, lighting and control circuits and operates at constant voltage under control of a voltage regulator.

The unit is equipped with four GE-752 traction motors, the same motors used on Alco road locomotives. Traction-motor connections are designed to give maximum utilization of the diesel engine over the entire speed range of the locomotive. The traction motors are automatically connected either in a series or series-parallel connection, and a third motor connection as a modification provides for motor field shunting while in series parallel operation at higher speeds. Automatic transition is furnished. Air for traction motor cooling is supplied by two multi-vane traction motor blowers, each supplying air for the motors on one truck. The rear blower is belt driven from an extension shaft of the main generator and the front blower is belt driven from the shaft between the air compressor and the radiator fan.

The underframe of the DL-430 is a steel weldment, and the superstructure is of welded steel plate. The DL-430 can be built in weights on driving wheels ranging from 196,000 lb to 248,000 lb. For the heavier axle loading of 248,000 lb, a heavier steel top deck is used which contributes to a more rigid frame and reduces the amount of ballast. The cab is of welded steel and is conventionally arranged. It is designed for the comfort and safety of the operating crew with emphasis on good visibility and low noise level. The control stand is mounted at the left of the operator's seat. A large fan blown heater with a hot-water core-type heating surface assures ample heating capacity for any weather conditions.

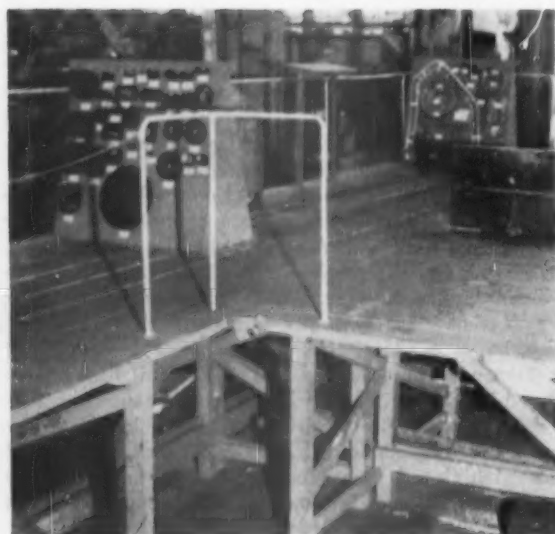
The 6-SL brake valve is located on the left side of the engineman so that he can operate it while facing either forward or backward. Air is supplied by the two-stage, three-cylinder, air-cooled air compressor which is driven directly by the diesel engine. The displacement at idling speed of 350 rpm is 79 cfm, and at full engine speed of 1,000 rpm is 255 cfm. A larger six-cylinder fan-cooled compressor with a displacement of 306 cfm at full engine speed is available. Two main reservoirs below the underframe have a total capacity of 60,634 cu in. For heavy yard switching service, Model DL-430 may be modified for multiple-unit operation by electric and air-brake equipment changes. Locomotives of this type have been delivered to the Ferrocarril del Pacifico.



General view of the arrangement developed by the Chesapeake and Ohio for diesel engine power assembly overhaul.

Power Assembly Overhaul by Conveyor Line

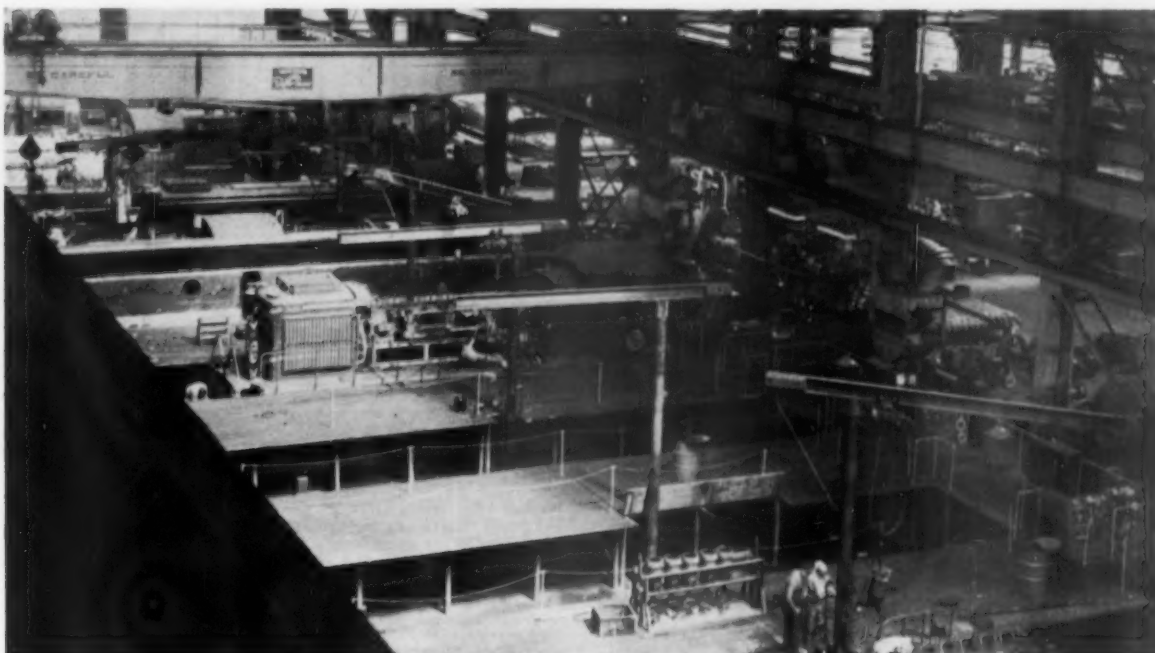
Chesapeake & Ohio systematizes diesel engine maintenance work, reducing time for some operations one-third of the needed when work is done on benches



THE USE OF CONVEYORS with work stations placed at intervals along the conveyors has revolutionized power assembly overhaul in the Huntington, W. Va. shops of the Chesapeake and Ohio. The volume of work does not warrant having an operator at each station, but there is room between stations for eight parts or eight assemblies of parts, so that one man may complete the work on eight parts at a given station and then proceed to take up the next operation at the next station. The work sequences, as in all operations of this kind, are strip, clean, inspect, assemble. The work described here is performed on EMD locomotives. Similar procedures are being developed for Alco and Baldwin locomotives.

This maintenance procedure was conceived by J. E. McLeod, chief mechanical officer, C&O, and worked out by J. L. Savage, shop superintendent, Huntington, W. Va. and his co-workers in the shop.

Another view of the portable wood platforms showing the method of placing hand rails and safety chains and the gasket stands which place all the required gaskets in a convenient position.

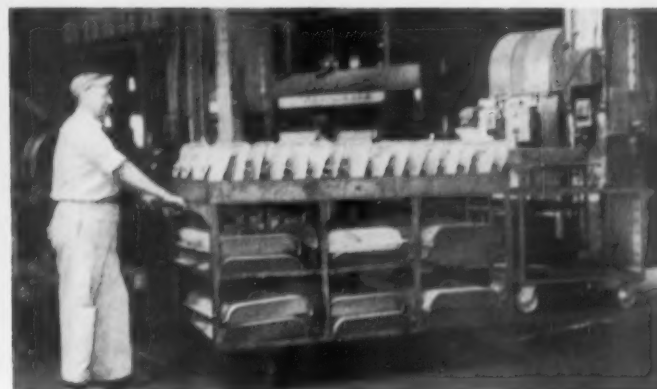
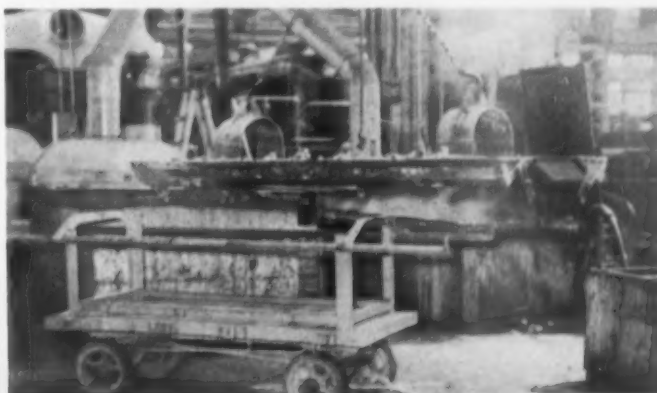


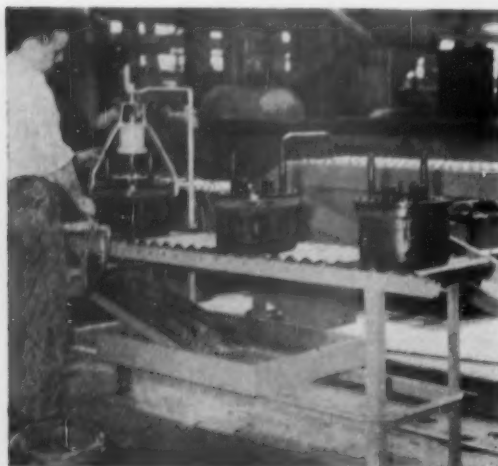
Locomotives brought in every two years for power assembly overhaul are lifted off their trucks and placed between portable wood platforms. These platforms, which are 5 ft 2 in. high and made up of sections 25 ft long, are inexpensive and may be easily moved to accommodate changing working conditions. Counterbalanced wings on the sides of the platforms allow for the handling of the locomotive by the overhead crane. Top deck and power assemblies are removed through the roof hatches after retaining nuts are taken off by impact wrenches. After top deck and power assemblies are removed, the engine frame, electrical equipment and other parts are cleaned, inspected and repaired as necessary.

At right: Top deck parts are placed in a multiple partitioned tray which is towed to the cleaning tank where the tray is picked up by an air hoist and lowered into the cleaning fluid. From the tank the parts are passed by means of the hoist to the Magnoglow inspection booth.

Lower right: Another specially built wagon brings air box and inspection covers to the cleaning tanks.

Lower left: This wagon brings heads, liners with pistons and connecting rods from the locomotive to the head of the work line. Here the head retainer nuts are removed by an impact wrench.





Upper Left: Heads lifted off of liners by a hoist are placed on this conveyor. The heads are pushed along under a jig equipped with an air cylinder and pusher plate where all four springs are compressed simultaneously. Valves and other parts fall into the tray below from which they are taken to the cleaning tanks. The heads also go to the cleaning tanks.

Upper right: At the far end of this divided-top conveyor, the liners are lifted off the pistons, leaving the lower edge of the pistons riding on short wooden rollers on either side with the connecting rods hanging down in the space between the two rows of rollers. As the pistons are pushed along the rollers, they slide, one at a time down the ramp in the foreground. As they slide down the ramp, a second copper-lined ramp which slopes in the opposite direction picks up the connecting rod so that as the assembly rolls out on the forward section of the conveyor, it lies in a horizontal position. Here the pin and bushing are removed. They drop down through a slot where a three-vaned separator deflects the pins to one side and the bushings to the other.

At left: Pistons are placed on a spindle on which they are rotated while they are cleaned with a motor-driven wire brush. After cleaning, they are placed on the rotating table behind the cleaning spindle. Turning the table carries the pistons to the lathe where they are regrooved, if necessary. Further turning of the table after the regrooving operation, carries the pistons to the Magnaglow-Zyglow booth for inspection.



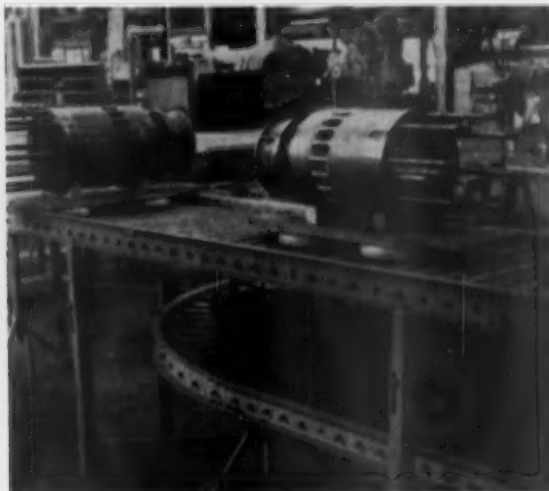
Lower left: Cleaned liners are lifted by hoist to this Lazy Susan where they are ridge-reamed and honed.

Lower right: After ridge-reaming and honing, the liners are lifted onto this table by a hoist where the water seal rings are cleaned with a wire brush.



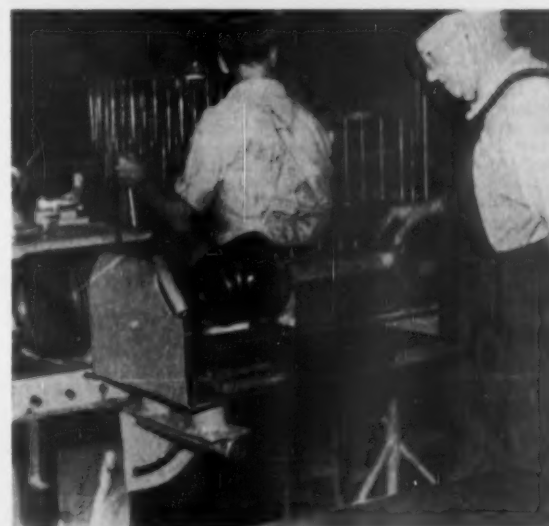


Upper left: After the operations described previously, all parts are inspected in the Magnaglow-Zyglow booth, or at the adjacent Magnaflux test stand. The canopy at the right is on rollers and may be moved by the operator to open or close the booth. A ventilating fan is provided for introduction of fresh air when the canopy is closed. Liners, piston carriers and pistons are tested by Magnaglow. Connecting rods and connecting rod baskets are tested by Magnaflux.



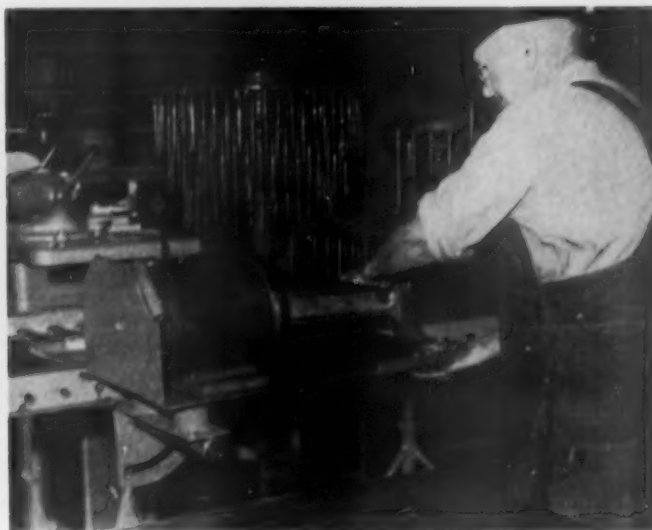
Upper right: After testing, liners and pistons (not shown) are placed on wooden trays and rolled along the upper of two conveyors with metal rollers. The different heights were selected because work on the liners are done at bench height while work on heads is down-hand. The lower conveyor turns out from under the upper to permit working on the heads.

At right: At the first work station on the upper conveyor, connecting rods and carriers which have been overhauled, are taken from adjacent benches, assembled and placed on wooden trays as shown at the right in this picture which shows the second working position. Here the piston has arrived on a tray which has a slot a little wider than the connecting-rod tray.



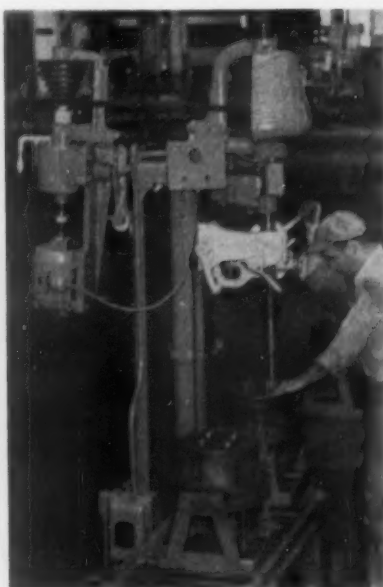
Lower right: This is another view of the second working position after the connecting-rod tray has been pushed into piston tray, putting the carrier into the piston. After they are put together, the piston is rolled forward onto the positioner in front of the conveyor.

Lower left: The positioner is then rotated 90 deg. which causes the carrier to drop firmly in place allowing the operator to insert the retaining ring. The positioner is then tipped back to its original position, and the assembled piston and connecting rod rolled back onto the conveyor.





At left: At the first work position on the cylinder head conveyor, the head is moved off the conveyor to the bracket shown where it is connected with a vertical, motor-driven spindle. At the left of the head is a motor driven brush on a balance arm which may be moved up and down vertically. Depressing the treadle



under the operator's foot causes the head to rotate while the wire brush is moved up and down over the side surfaces of the head. In the original design, the treadle switch started both the brush and the rotation of the head. Later a hand-operated control was included for controlling the brush separately.



Center: After the head is brushed, it is placed on a carrier which holds it either right-side or bottom-side up. At this work position the valve seats are being faced.

At right: At the third head working position, the valve seats are ground by a suspended tool.

At the end of the conveyor line, heads and liners, together with the small parts needed for reinstallation, are placed on a specially-built truck and towed back to the locomotive on which they are to be used.



At left: At the fourth position, valves which have been cleaned, tested and ground in a valve grinder are taken from a rotating rack shown in the following picture. They are dropped into place and a wooden plate is put on top of them and secured in place by a bolt through the injector hole.



At right: With wooden valve retainer plate in place, the head is turned over on its carrier and pushed under a frame secured to the conveyor, in which there is an air cylinder which the operator uses, to depress the four valve springs simultaneously while he inserts the valve retainers.

Center: At the end of the two carrier assembly lines, liners and heads are brought together on a wagon which is used to return them to the locomotive. The section of the wagon in which



the heads and liners are secured is supported on bearings. At the balancing point on each end, permitting work to be done with the assemblies either end up. A long box, (not shown) is secured at one side for retaining all small parts needed to put the assembly together.



Let's Look at These Lightweights

ACF, Budd, General Motors, and Pullman-Standard have designed low-slung trains to speed service and reduce passenger train costs.

Higher average speeds without excessive top speeds, reduced operating and maintenance expenses, and low first cost are goals which are being met by a series of radically different passenger trains. Four builders have departed from long-accepted standards in attempting to solve the critical situation which confronts all passenger-carrying American railroads.

Budd's original Burlington Zephyr and the first Union Pacific streamliner produced by Pullman-Standard were depression-day attempts to meet the same problems. They incorporated many of the ideas which are being used on tomorrow's trains today. They had low profiles and extremely light weights, were completely articulated, and utilized head-end power. They were intended to haul coach passengers faster and more economically.

ACF has completed its first American Talgo-type coach train and has orders for two more. This builder is in this field with six years' experience and over a million miles of service on the two pioneer Talgos built in 1949 for Spain. The original Talgo design has been greatly altered for American service and was described in the June, 1955, issue of *Railway Locomotives and Cars*, page 55.

The lightweight Budd tubular train has eliminated the center sill, but retains the AAR standard length of 85-ft. The cars will have couplers and platforms of conventional height and arrangement, but the floor is dropped between the trucks and buffing loads are carried by the side sills. The train will include a power car, and all train heating will be done electrically. Budd has relied on their four-wheel coil-spring trucks and many other proven passenger car components.

The General Motors cars are based on the 40-passenger bus body produced by GM's Truck and Coach Division.

This body is widened for railroad service, and is mounted on a rugged underbody structure. These cars are part of an integrated design which includes the Aerotrain locomotive described in the January, 1956, issue of *Railway Locomotives and Cars*, page 49. The cars are carried on two single-axle trucks featuring the air springs used on the GM bus. They are designed for operation in one direction, but can be handled from either end when being switched. Braking, air conditioning and heating

What Hauls Them?

Owner	Train	Motive Power
Boston & Maine	Talgo	Not Specified
Rock Island	Talgo	One 1,200 hp EMD diesel-electric locomotive
General Motors	Aerotrain	One 1,200 hp EMD diesel-electric locomotive
New Haven	Talgo	Two 1,720 hp Fairbanks Morse dual power (diesel-electric and electric) locomotives—one on each end of the train.
New Haven	Train X	Two 1,000 hp Baldwin-Lima-Hamilton dual power (diesel-mechanical and electric) locomotives—one on each end of the train.
New York Central	Train X	One 1,000 hp Baldwin-Lima-Hamilton diesel-hydraulic locomotive.
Pennsylvania	Tubular	Conventional electric or diesel-electric locomotives from present motive power fleet.

are all newly developed, and head-end power is utilized. All air conditioning equipment is located under the car and distribution of air is made through under-floor and side-wall ducts. Floors are nearly as high as those used on conventional coaches.

The Pullman-Standard Train X is composed of two-unit articulated cars. Each unit has only a single axle,

and a set of retractable dolly wheels are installed under one end of one unit so the assembly can be switched. Trains of these two-unit cars are assembled around a two-axle center car. Articulated car running gear is arranged to trail in each direction from the center car and the train is designed for operation in either direction. This running gear is of the guided-axle type steered by

TRAIN	1955 STANDARD COACH	TALGO
BUILDER		ACF INDUSTRIES
OWNER	Late Model AAR Standard Coach	One 4-Car Train—Rock Island One 5-Car Train—New Haven One 5-Car Train—Boston & Maine
BASIC PASSENGER CAR	One unit with two 4-wheel trucks. Total—4 Axles	Three units semipermanently coupled. Center unit has an axle at each end. End units have single axles at outer ends and ride on center unit at the inner ends. Total—4 Axles
LENGTH, ft-in.	85-0	103-3
HEIGHT, ft-in.	13-6	10-10
WIDTH, ft-in.	9-11	10-2
COUPLER HEIGHT, ft-in.	2-8	1-7
FLOOR HEIGHT, ft-in.	4-3	2-4
HEIGHT TO CENTER OF GRAVITY, ft-in.	4-7	3-6
WEIGHT, lb	131,000	67,000
SEATING CAPACITY, 3-ft centers	84	96
CARBODY SUSPENSION	Coil Springs	Coil Springs
BRAKE	Automatic-air or electro-pneumatic actuated clasp tread type with two iron shoes.	Automatic-air actuated drum type with internal expanding shoes.
ELECTRIC SYSTEM	Axle-generated direct current with load of about 20-kw.	Head-end generated 440 volt alternating current with load of about 40 kw. Trickle-charged emergency batteries on car.
HEATING	Overhead and floor steam heat.	Overhead and floor resistance-type heaters supplemented with oil-fired hot water system for extreme temperatures. Heater on car.
AIR CONDITIONING	8-Ton overhead evaporator with air distributed through center ceiling duct, and compressor and condenser located under car floor between trucks.	9-ton system using two complete floor-mounted 4.5-ton units installed at outer ends of end units. Distribution through overhead ducts.

the coupling arrangement between the units. The interior of the car is isolated from the structure and skin in order to keep transmitted noise at the lowest possible level even though the low-slung arrangement would produce a high level of road bed noise. The air-spring suspension is used. There is complete electric heating.

The success of these radical trains will be proved by

a whole series of tests and experimental services in which some of the trains are now operating. Head end steam heating has completely disappeared, but in every case has been replaced with head-end electric power. The trains have reduced the weight and investment per passenger. Tests and time will prove their popularity and indicate whether they are a final solution.

TUBULAR	AEROTRAIN	TRAIN X
BUDD	GENERAL MOTORS	PULLMAN STANDARD
One 8-Car Train—Pennsylvania (7 Coaches and 1 Power Car)	Two 10-Car Trains in Experimental Service, but owned by General Motors	One 9-Car Train—New Haven One 9-Car Train—New York Central
One unit with two 4-wheel trucks. Total—4 Axles	One unit with single axle truck at each end. Total—2 Axles	Two single axle units permanently coupled and articulated. The shorter unit without vestibule has retract- able wheels for switching. Total— 2 Axles
85-0	40-0	99-3
11-9	10-9	11-0
10-0	9-6	10-0
2-8	—	—
4-3 and 2-0	3-7	2-0
3-6	3-9	3-8
82,000	38,000	65,000
82	40	88
Coil Springs	Air Springs	Air Springs
Automatic-air actuated Budd disc type.	Straight-air actuated single-shoe tread type with composition shoe.	Electro-pneumatic actuated single- shoe tread type with composition shoe.
Head-end generated 440 volt alter- nating current with load of about 50 kw.	Head-end generated 440 volt alter- nating current.	Head-end generated 440 volt alter- nating current.
Overhead and floor resistance-type electric heaters. No other heating.	Electric resistance immersion heater warms water for coil in air duct supplemented with oil-fired heater for extreme temperatures. Heater on car.	Overhead and floor resistance-type electric heaters. No other heating.
8-ton floor-mounted evaporator and blower. Distribution through overhead duct. Compressor and condenser under floor at the end of the car.	5-ton underbody-mounted system with distribution ducts under the floor and in the side walls. Air discharged at floor level and just below windows.	Complete equipment floor-mounted with air distribution in overhead duct. Independent system in each unit of car.

WESTERN PACIFIC MECHANICAL DEPARTMENT—PART II



Diesels are maintained at the Oroville roundhouse and diesel shop.

How Does WP Handle Locomotive Maintenance?

Scrapping rather than reclamation used for many engine parts.

Lube oil is reclaimed and economy fuels are used.

Part I in the January issue described the reductions in operating costs that have been effected in the Mechanical Department. The road was dieselized early and kept average car age low by many recent car purchases. Locomotives are given a close inspection monthly. Work on road power is done at the Oroville diesel shop which was converted from the 18-stall steam enginehouse. Presently there are no facilities for removing engines and generators, but plans for a new diesel shop at Oroville will include overhead cranes and much other modern equipment.

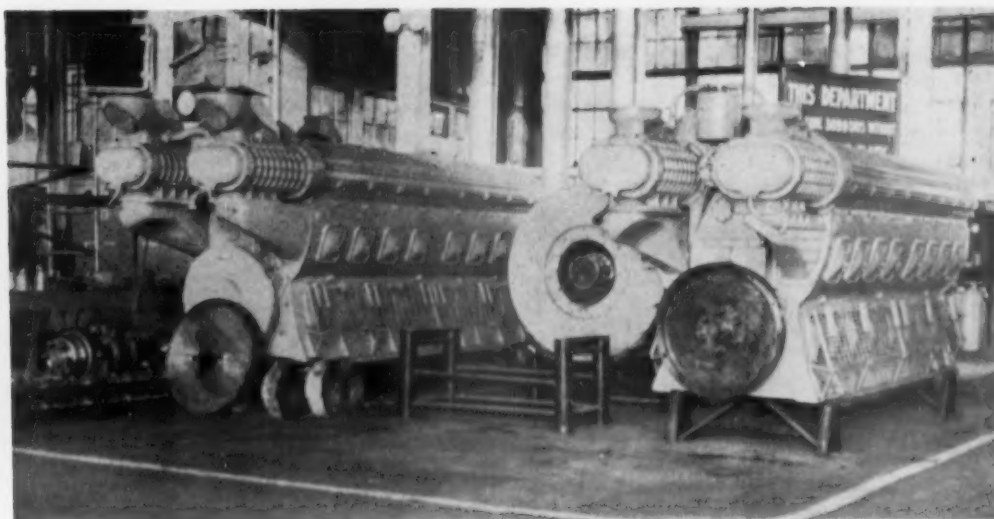
Most of the units are still operating with their original engines accumulating well over a million miles; that is, they have never been removed for a general overhaul. Since 1939 only 15 crankshafts have been renewed. Only two were lost on account of faulty maintenance, and none on account of lubrication failures. None of the engine parts are reclaimed in the sense that worn metal is re-

placed or items machined for oversize parts. All parts which can be reconditioned are carefully checked and made ready for further service.

The WP policy is to obtain maximum service life from parts and then scrap them, studies indicating that in most instances it is uneconomical to reclaim the integral parts of diesel engines after the service life has been expended. Some of the serious drawbacks to extensive reclaiming are the increased possibilities of failure, short service life of reclaimed parts, and the punitive or associated damage which generally occurs when reclaimed parts fail.

Repair Cost Reduced

The policy described is credited with keeping maintenance cost at a minimum which is currently about twelve cents a mile, and on an accumulative basis this cost amounts to about six cents a mile. The figures quoted include all costs such as store expense, accidents,



1500-hp diesel engines ready to replace bad-order units as engines go through shops.

and all heavy as well as running repairs. Less labor is necessary when new parts are used. At the present time, the diesel maintenance forces amount to 0.7 men per unit which compares with the national average of 2.2 men per unit.

Traction motors and main generators are sent to the manufacturer and replacements are received through unit exchange. Certain minimum traction motor and generator output is needed to justify the expense of building a modern-equipped electric shop and establishing a work force. In order to make such a shop economical, the WP believes a production of at least two traction motors a day is required. The WP record shows traction motor failures of less than two per cent per annum with a total of 672 motors now in operation which compares favorably with other railroads where failures of 10 to 20 per cent are sometimes reported.

Traction motors are removed for dipping and baking from freight and passenger units at 300,000-mile intervals, which is necessary mainly for armature bearing renewal. This practically eliminates the possibility of a costly armature bearing failure on the road. Traction motors under switch engines are removed for dipping

and baking only when it is determined by megohmmeter tests that the insulation is deteriorating. This handling has permitted maximum service life of traction motors under switch engines, most of which are still in operation after 14 years of service.

Main generators are given a megohmmeter test each time the locomotive arrives at a maintenance terminal. The result of this test determines when generators must be removed for dipping, baking and other inspections. Through this method, most of the units still have the original main generators which were installed at the factory, with a service mileage of well over a million miles.

The renewal of relays, wiring interlocks, and other electrical devices is taken care of on a progressive basis, and one of the units have been taken out of service for a complete general renewal of these items. The condition of all circuits is determined by the "meg" test. All units, after being assembled in a consist of one locomotive, are given a sequence test at which time all contactors are checked to make sure they are operating properly at each transition position and the load regulators indicate proper loading for each throttle position. At the same time, the battery-charging meters are checked as well as all gages and other meters pertaining to the proper operation of the unit and locomotive.

DIESEL LOCOMOTIVES ON THE WESTERN PACIFIC

Number of units	Make type	Unit hp.	Total hp.	Age in years
48	EMD F-T	1,350	64,800	15
48	EMD F-7	1,500	72,000	5
6	EMD FP-7	1,500	9,000	5
9	EMD F-3	1,500	13,500	8
13	EMD CP-7	1,500	19,500	3
8	EMD CP-9	1,750	14,000	New
14	ALCO Switch	1,000	14,000	12
8	ALCO Switch	660	5,280	13
5	BALD Switch	1,000	5,000	10
3	EMD Switch	600	1,800	16
6	EMD Switch	1,200	7,200	3
168			226,080	

Diesels Maintained at Oroville

All maintenance work on passenger and freight road diesels is done at Oroville, Cal., where records are kept and show the following average service life of diesel engine parts: pistons, rings and main bearings, 400,000 miles; cylinder liners, 500,000; cylinder heads and traction motors (before rewind) 600,000 wrist pins, crankshafts and main generators (before rewind), 1,000,000 miles; crankcases, indefinite but often over a million miles.

Diesel traction wheels when new generally operate about 200,000 miles in freight service before it is necessary to remove them for turning. The wheels are turned only once and will run another 200,000 miles before re-

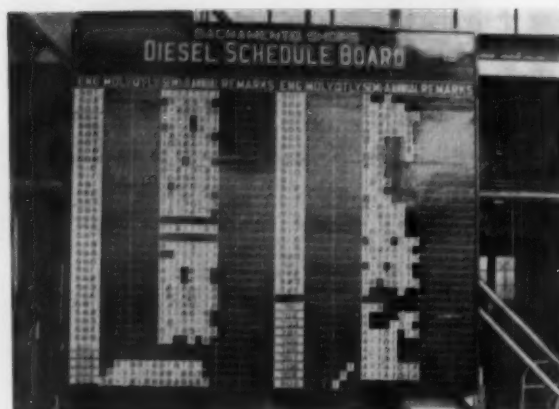
moval and scrapping. Some of these wheels on the WP run 325,000 miles before being removed for turning. Traction wheels removed after normal wear generally have sharp flanges. Class B traction wheels are used on all diesel units.

Passenger wheels average 85,000 miles before turning and are generally taken out for tread wear. Some of the wheels, however, make 150,000 miles before turning is required. Passenger wheels are turned twice before they are considered unserviceable for passenger use.

Oil changes are scheduled at six months' intervals, and the condition of the oil is determined by blotter, viscometer, color and water tests. Such tests are made each time a unit returns to Oroville for servicing, which occurs every ten days or about 2,000 to 3,000 miles of service. The oil is checked by a machinist inspector who takes sample of oil from each unit. Laboratory analysis has not been found necessary for the successful operation of the units. Lube oil filters of the waste-packed type are changed on an average of 10,000 miles, or approximately once a month. The WP finds that this six-month oil-change policy saves costly filter changes, because when oil is run longer, filter changes have to be made more frequently, and it is more economical to change oil than filters.

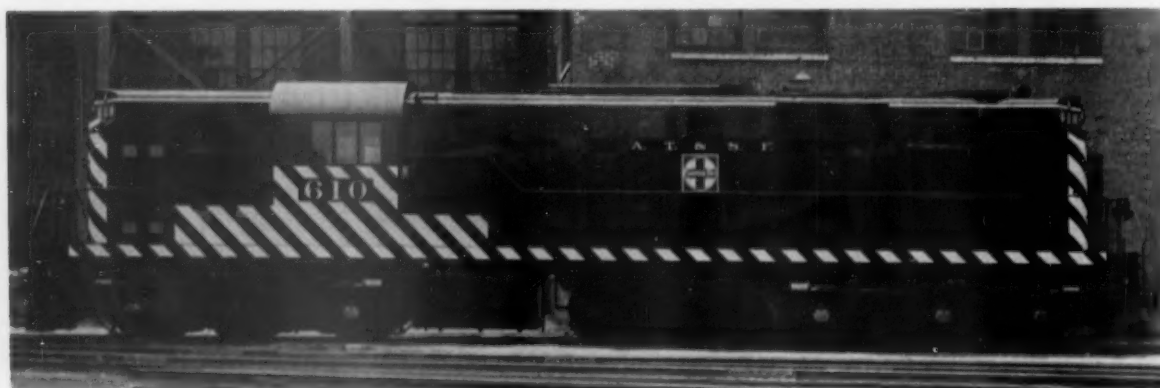
Economy Fuels Used

Drained oil is reclaimed and reused. The recovery of the drained oil amounts to 92 per cent of all oil reclaimed and about 19 per cent of the total oil used. Reclamation costs about 39.4 cents a gal, resulting in a saving of 8.6 cents a gal. A total of 47,412 gal is reclaimed annually, resulting in a saving of \$4,082 in lube oil.



Diesel schedule board in use at the Sacramento General Shops.

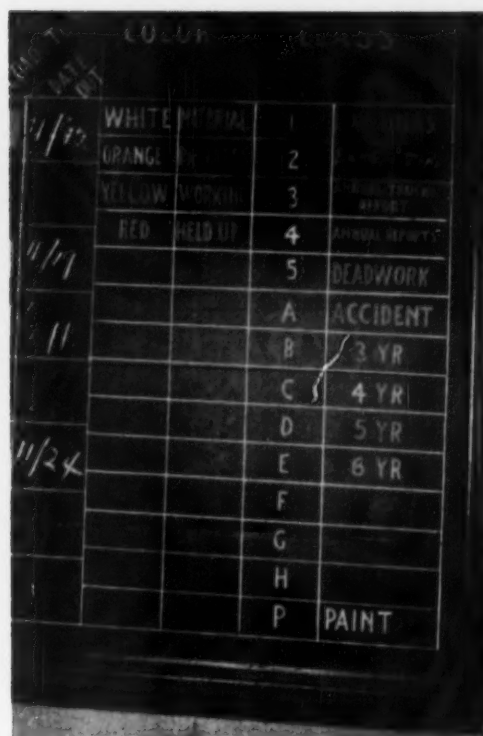
Economy fuels have been used for the past year without adverse effect in the operation of the diesel engines. This fuel is supplied by various oil companies, of which some furnish a straight cracked fuel, and others a blend of cracked and straight run fuel, which is all mixed in the storage tanks. The only difference noticed so far on the WP between the use of the economy fuel and straight run fuel is that fuel oil filters have to be cleaned or changed more frequently than when only the straight run fuel is used. This results in a slight increase in maintenance cost, but still permits a saving of approximately \$150,000 per year to be made in fuel costs. No adverse effect has been noted in the service life of engine parts through the use of economy fuels.



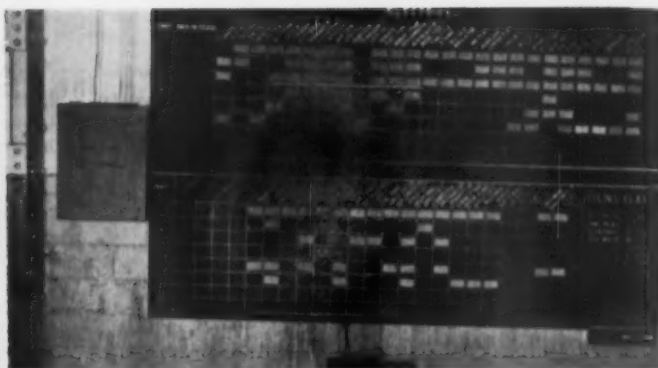
Santa Fe Gets Heavy-Duty Road Switchers

Santa Fe has been receiving the first ALCO DL-600's ever sold. Two prototype units made demonstration runs on many roads all over the country. This six-motored road switcher is rated at 2,250 hp. Santa Fe has twenty of these locomotives and the Pennsylvania ordered five. The PRR units were ordered for passenger helper service on the

grade west of Altoona, Pa.—the section including the Horseshoe curve. While the six motored road switcher is not new for ALCO, this is their first with a rating in excess of 1,600 hp. Recently ALCO has been turning out models of their 900 hp yard switcher, the DL-430, which is described in this issue.



A section at the right of the board tells the meaning of the different colored tags and describes the repair symbols.



Two horizontal columns are used both for the electrical and the mechanical boards to avoid excessive length.



How a white tag would indicate that the air work on the unit due out 11/19 is being held up by lack of material

Simplified Schedule Board for Heavy Repairs

One road has combined the use of colored metal tags, a simple and expandable repair classification, and a pair of large boards marked by principal overhaul items. The result is an easily read indicator of just what the status is of each part of the overhaul as well as what items are being delayed and why.

One of the boards is for mechanical items and the second is for electrical items. The various jobs to be done are listed in the order they are normally performed. The job descriptions are listed across the top of two rows on each of the boards (the two rows are used because space where the boards are mounted is not long enough to list either the mechanical or electrical series of jobs in a single row). At the lower right side of each board is a description of what the different symbols mean—thus if a unit is marked LAP it means that it is to get a Class I repair, it has been in an accident (A) and is to be painted (P).

The key to the meaningfulness of the system is four different colored metal tags with the following meanings:

- | | |
|--------|--|
| Orange | A job that either has been done or is not to be done |
| Yellow | A job being worked on |
| White | A job held up awaiting material |
| Red | A job delayed because another craft is in the way |

When a unit arrives at the shop its number and type of repairs due are listed on both the mechanical and electrical board. All spaces lined up horizontally with the unit number are blank at this time.

The first step in the use of the system is to place orange tags on the spaces occupied by items that are not to be done in the ensuing overhaul. The remaining spaces, which are blank, thus indicate jobs to be done but not yet assigned. When such jobs are assigned, a yellow tag is attached to the space to indicate that the job is being worked on. When a job is completed an orange tag takes the place of the yellow one in the appropriate blank space.

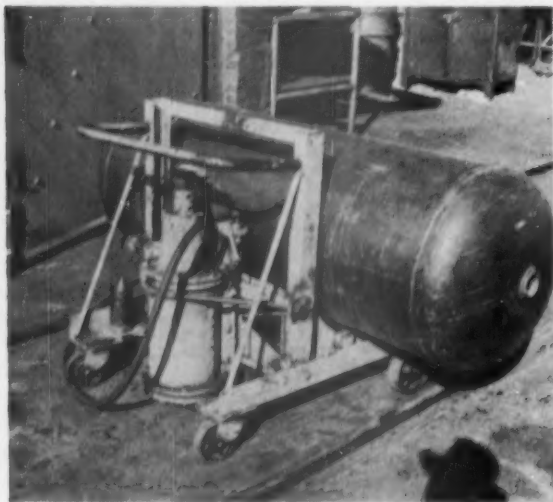
When a unit is ready to leave, all spaces will have orange tags.

The red and the white tags tell supervisors in an instant what jobs are being delayed and what the cause of the delay is. A red tag on the mechanical board usually means that a job is being held up because electrical repairs in the vicinity is causing the interference, while a red tag on the

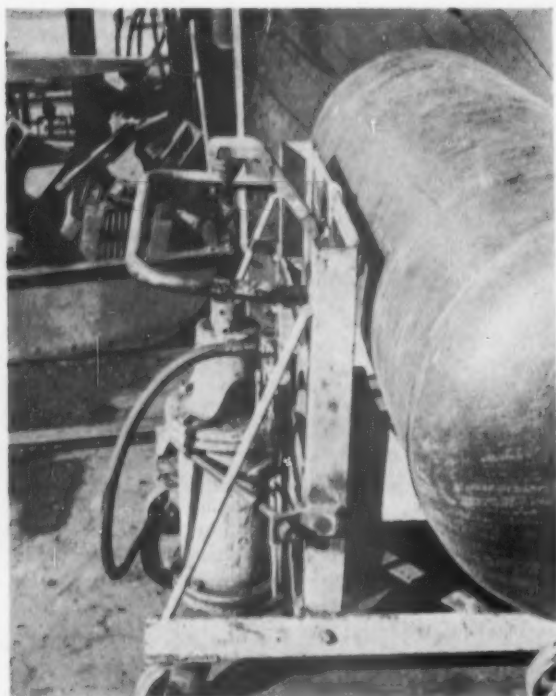
electrical job board usually indicates interference from mechanical work.

The white tags serve a function in addition to their benefit to the shop supervision. They serve as both an instant and a constant reminder to stores and top supervision that a repair job is being delayed because the needed material for doing it is not available.

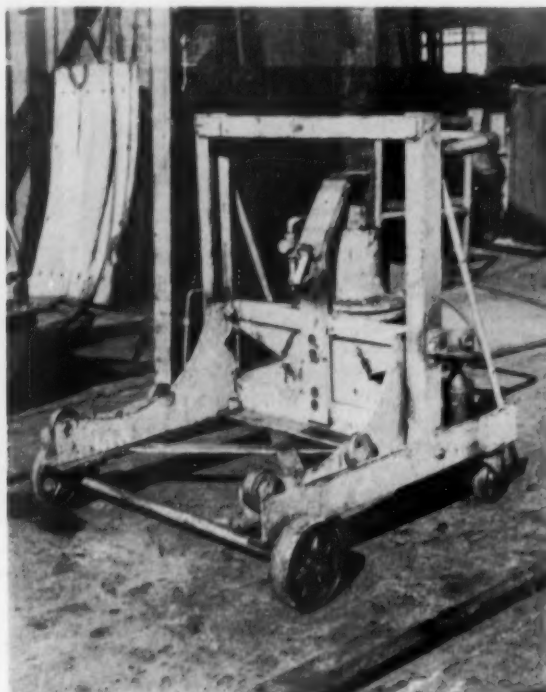
High Lift Air Jack



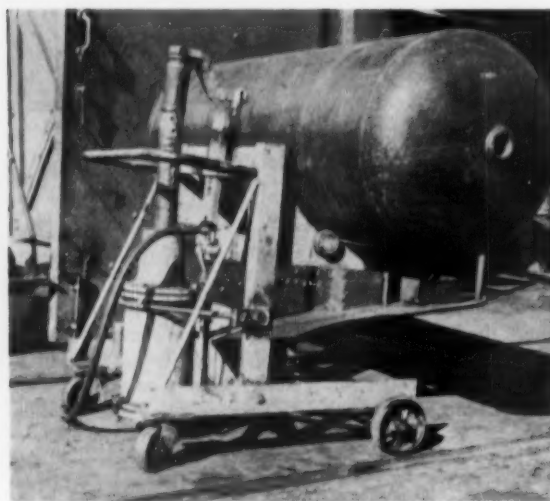
Air reservoirs can be rolled on and off the platform of this lifting jack.



The drum is first raised part way, the carriage hooked to the main frame, and the shaft lowered.



A special hook and shaft insert permits raising the drum about $1\frac{1}{2}$ times the stroke of the piston.



An extension piece inserted in the shaft then raises the carriage nearly another foot to apply the drum to the unit.

ELECTRICAL SECTION



Fig. 1—The small size and light weight of the d-c tester permit its being carried to any place where it may be needed.



Fig. 2—A 0 to 5 Kv test set having 40 watts input at 110 volts. It is equipped with a sensitive vacuum tube microammeter to detect currents from 0.1 micro-amp to 1 milli-amp in five ranges.

Benefits to Be Derived From D-C Hi-Potting

Some pros and cons concerning a much discussed subject and a description of equipment and procedure which should lower costs and reduce failures

Railroad electrical maintenance techniques are still in a relatively fluid stage as compared with, for example, the electrical maintenance program of the electric power companies. A further factor involved in railroad maintenance is the severe operating conditions to which electrical equipment is subjected. Dirt, heat, moisture and vibration are some of the major enemies of electrical insulation.

One of the more difficult problems in railroad electrical maintenance work is to know that the insulation is in

Abstract of a paper presented at the Mid-Winter General Meeting of the American Institute of Electrical Engineers, held in New York, Jan. 30 — Feb. 3. Mr. J. K. Hewson is President, The Hewson Company, Inc. and Mr. D. E. Stafford is Chief Engineer, National Electric Coil Company.

**By J. K. Hewson and
D. E. Stafford**

good condition and that such insulation is not going to fail without warning.

The major problem, discussed in this article, is how to detect deterioration in the electrical insulation of the various parts of mobile electrical machinery before actual breakdown and failure in service occurs and by a test method which in itself does not damage the insulation.

Because of weight and space limitations, the insulation of railroad equipment, especially the traction

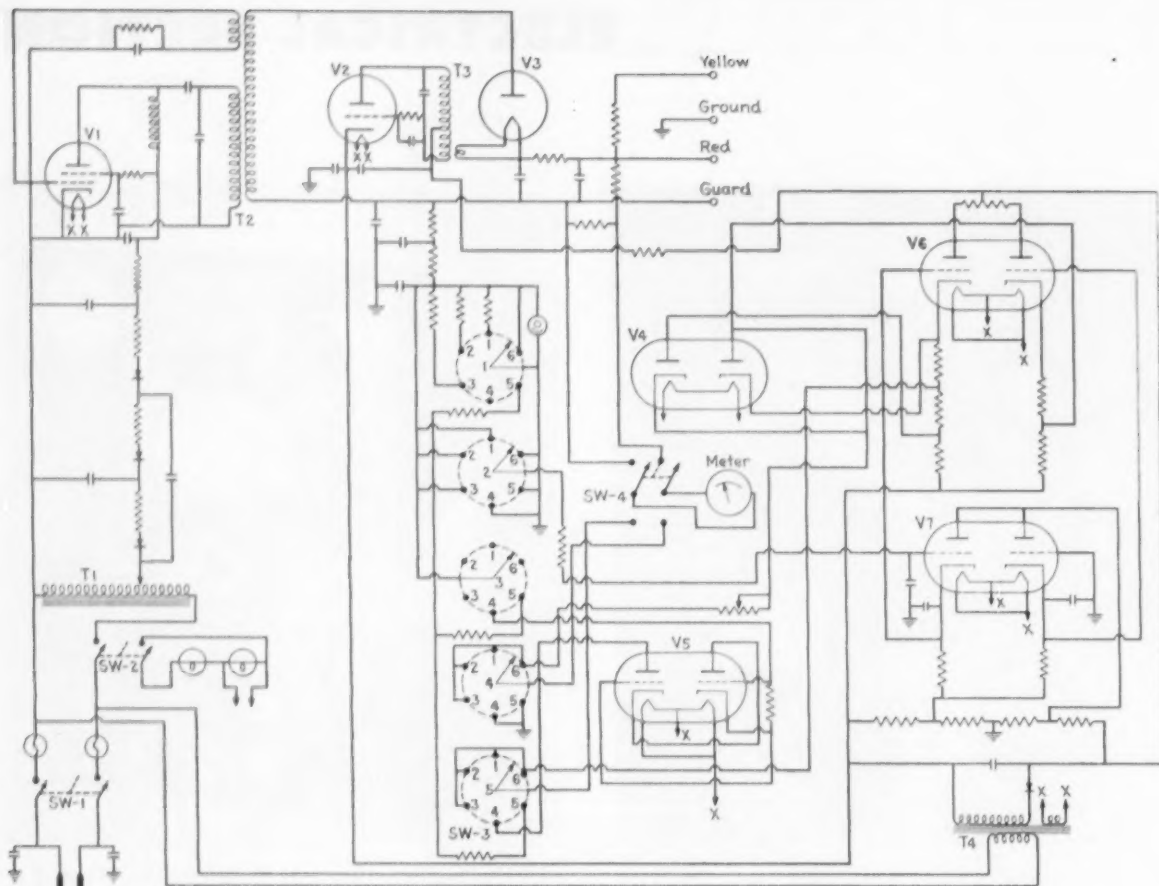


Fig. 3—Schematic circuit diagram of a d-c high voltage insulation tester.

motors, is thinner, stressed more, and worked harder under more adverse conditions than on almost any other class of equipment. Before applying insulation tests to traction motors and generators of the type and sizes as used on diesel-electric and a-c trolley locomotives and cars, one must take into consideration the above mentioned different design and operating conditions. Although there has been extensive application of d-c testing to high voltage stator windings as used in the main generators of electric power systems, and many papers have been published, giving the results of these tests, comparatively little d-c testing has been done on railway equipment.

To provide maximum ratings in the available space, the armature windings of traction propulsion motors take advantage of the dielectric and heat resistant properties of the more recently developed insulation materials and are provided with a lower thickness insulation wall when compared with similar traction equipment of older designs. In general, these units are provided with Class H or Class B,—or a combination of the two classes.

A number of authors in earlier technical papers have pointed out the advantages of maintaining records of the insulation resistance as periodic d-c tests may be applied to a winding during normal overhaul or maintenance outages. It is now the practice of most operators of transportation motors and generators to schedule regular overhaul equipment outages, either on a mileage basis or on

a calendar basis. Therefore, tests which would indicate the relative condition of insulation will fit very nicely into these regularly scheduled maintenance service periods. An instrument, described in the following section, has

DC TEST DATA

DATE: 11-15-15

MAKE: _____

TYPE: TRACTION MOTOR ARMATURE

TEMPERATURE: 72°F

REMARKS: NEW WINDING-NEW

COMMUTATOR

KILO-VOLTS	TIME IN MINUTES				
	1/2	1	2	5	10
.50	.48	.37	.26	.16	.09
1.0	.62	.44	.34	.21	.16
2.0	1.5	1.0	.72	.46	.37
3.0	1.9	1.4	1.1	.70	.57
4.2	2.2	1.8	1.4	1.1	.74

Fig. 4—Form used for recording test data. The recorded values in micro-amp show the relatively small leakage currents involved in these tests.

been developed which will permit the accumulation of the necessary test data to fulfil the requirements suggested in this discussion.

A High Voltage D-C Insulation Test Set

This instrument incorporates the requirements for a field insulation test set of performance, sensitivity, portability, ruggedness, freedom from damage to the equipment under test, and safety for test personnel.

The 5-kv insulation test set, shown in Figs. 1 and 2, is a suitable instrument for performing insulation resistance and d-c over-potential tests on medium sized electrical systems in the 1,000-volt and lower voltage classes, such as railway mobile diesel-electric equipment. Its continuously variable power supply and unusually sensitive micro-ammeter permit the making of accurate insulation resistance tests on anything from the smallest test sample to the largest traction motor or generator. Its full 5,000-volt output voltage allows over-potential tests to be made on all low and medium voltage classes of equipment.

The sensitivity, wide range micro-ammeter of this instrument indicates insulation leakage currents from 0.01 micro-amperes to 1.0 milli-ampere. This very wide range of current (contained in five meter ranges of 0.1, 1.0, 10, 100, and 1,000 micro-amperes full scale) includes values of leakage current likely to be encountered in almost any test situation. The 5,000-volt power supply has rated current output of 1.0 milli-ampere. In actual practice, somewhat more current than this is available for short periods without danger of damage to the instrument. The instrument is not harmed if its output is short-circuited for a short period.

Two high voltage terminals are provided:—a yellow terminal which is connected through a high value current limiting resistor, and a red terminal which is connected directly to the power supply output. The maximum current to the yellow terminal is limited to a value such as to create no hazard of dangerous shock if the operator should accidentally come in contact with wires connected

to this terminal. Although the steady short-circuit current through the red terminal is very small, the surge due to discharge of the internal capacitors on shorting is appreciable, and standard safety practices for handling high voltage equipment should be followed when using this terminal. A guard terminal is also provided for making guarded insulation resistance tests when desired.

The test instrument is small in size (less than 1-ft cube) and light in weight (less than 15 lb). It is housed in a sturdy lightweight aluminum cabinet. A standard convenience outlet (115 volts, 60 cycles) is required to power the instrument. Power consumption is less than 40 watts. D-C Insulation Test Procedures

The features sought in a test procedure intended especially for use in a railroad electrical insulation maintenance program include:

- Reasonable certainty of the present condition of the insulation, i.e., whether the insulation under test is in sound condition and may be operated under full load for a further period without additional testing.
- Complete portability of the test equipment, i. e., small and light enough to be easily carried by one man.
- Rugged test equipment that is not easily damaged or put out of adjustment by normal usage.
- Safe test equipment, i. e., safe from the standpoint of the operator and also safe from the standpoint that the test will not damage or weaken the insulation test specimen.

This last requirement is of particular importance to the electrical maintenance men on railroads, as under I. C. C. Rule 253, an over-voltage test on all locomotive electrical equipment is required at least once a year. This I. C. C. rule reads as follows:

"Not less than once every year, an insulation dielectric test of not less than one-minute duration shall be applied to all circuits and parts carrying current with potential of more than 150 volts. The voltage applied to circuits, other than motor or generator windings, shall be not less than 75 per cent above the normal working voltage; the voltage supplied to windings shall be not less than 50 per cent above the normal working voltage. A careful examination

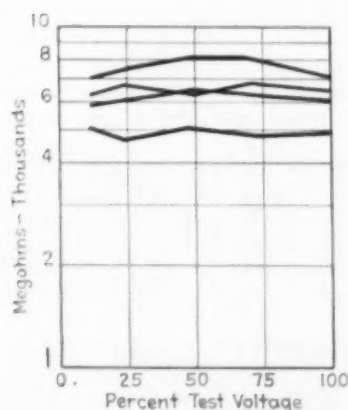


Fig. 5 (at left)—Insulation resistance versus voltage—curves for new traction motor armatures.

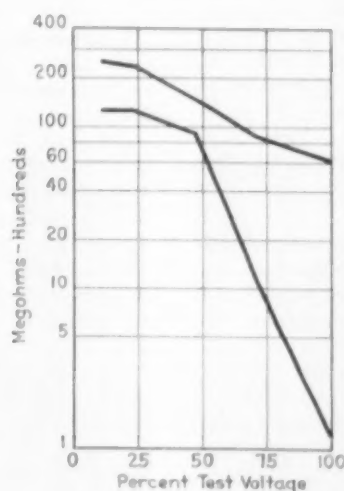
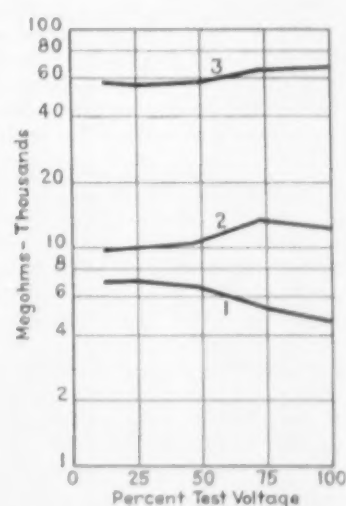


Fig. 6 (center)—Insulation resistance versus voltage—curves for armatures removed at scheduled motor overhaul.

Fig. 7 (at right)—Insulation resistance versus voltage for an armature. Curve 1 as removed from motor to be overhauled. Curve 2 same armature after trichloroethylene vapor de-



greasing and ground corn cob blast cleaning. Curve 3 same armature after varnish impregnation and baking.

shall be made of any weakness indicated and all defects remedied before the locomotive is put in use."

An a-c high potential test may be applied to meet I. C. C. requirements, but does not provide any indication of the relative condition of the insulation. A high-voltage d-c insulation resistance test, when correlated with temperature, humidity, cleanliness of the insulation under test, and past records of insulation resistance, can give a good indication of the amount of moisture present, either on the surface of, or absorbed into the interior of the insulation.

Standard A. I. E. E. specifications call for making these d-c insulation resistance tests at from 500 to 5,000 volts for all classes and voltage ratings of machinery. Recent investigation indicates the desirability of making insulation resistance measurements at considerably above the operating voltages. Some research points towards the fact that a series of insulation resistance measurements made at successively higher voltages plotted as a function of voltage and extrapolated to the zero resistance point will indicate the approximate dielectric strength of the insulation before it is actually broken down. Other workers claim however, that this is not necessarily so, and further work is needed in this field before definite conclusions may be reached.

A second test to be applied to a system of electrical insulation is an over-potential test. This is usually made after an insulation resistance test at lower voltages indicate that the insulation is clean and dry. Either a-c or d-c voltage may be used for over-potential tests. When the over-potential test voltage is d-c, and of sufficient magnitude, it is sufficiently searching to pinpoint any insulation faults or damage which would be likely to cause breakdown in service with negligible probability of damage to sound insulation.

Recent studies indicate repetitive application of high potential d-c tests are not damaging to sound electrical machine insulation. Each successive a-c over-potential test reduces the life of the insulation. These factors, plus the availability of small lightweight high voltage d-c insulation testers, capable of making both insulation resistance and high potential tests, are resulting in the extensive use of d-c tests to supplant a-c tests.

The d-c tests, when performed on a regular basis and correlated with previously obtained data, will enable the maintenance specialist to detect impending weaknesses before they become serious enough to cause failure in service and may enable a less costly repair to be made.

Test Results

The traction motor unit was selected for concentrated testing and most of the data presented is based on the armature units for traction motors. In general, all the armatures tested have approximately the same dimensional characteristics, although there are variations in copper size, copper arrangements in the slot, and the insulation types among the motors of various manufacturers. These variables apparently do not change the insulation resistance appreciably. The motors tested were designed for operating voltages of 1,000 or less. The over-potential test was combined with the insulation resistance test in the form of a series of 10-minute insulation resistance measurements at voltages from 500 volts up to the over-potential test voltage. The maximum d-c voltage

applied in the tests was 1.6 times the normal one-minute a-c over-potential test voltage.

In order that the necessary test values may be recorded, a form of the general type as shown in Fig. 4 was used. This form provides for recording the micro-ampere leakage current meter readings at 1/2-min., 1-min., 2-min., 5-min. and 10-min. intervals at various applied d-c voltages. A typical set of readings is included.

Figure 5 shows test curves of insulation resistance as plotted for new armature windings. Figure 6 shows similar tests on old windings of the same type as shown in Fig. 5. These windings had not failed and would normally be suitable for reconditioning and re-using on what is termed in the railroad industry as a mileage overhaul. Accumulation of test data of this type on used armatures, using the instrumentation covered in this paper, should permit the detection of some types of impending faults. A continued reduction of the 10-min. insulation resistance values determined at regular mileage service periods would be an indication of insulation deterioration. Surface leakage caused by an accumulation of conducting material on the armature surfaces providing leakage paths results in curves of the type shown in Curve 1, Fig. 7. This armature gave a test curve as shown in Curve 2, Fig. 7, after trichloroethylene vapor degreasing and a corn cob blast cleaning. After vacuum impregnation in an insulating varnish, the insulation resistance curve was as shown in Curve 3, Fig. 7.

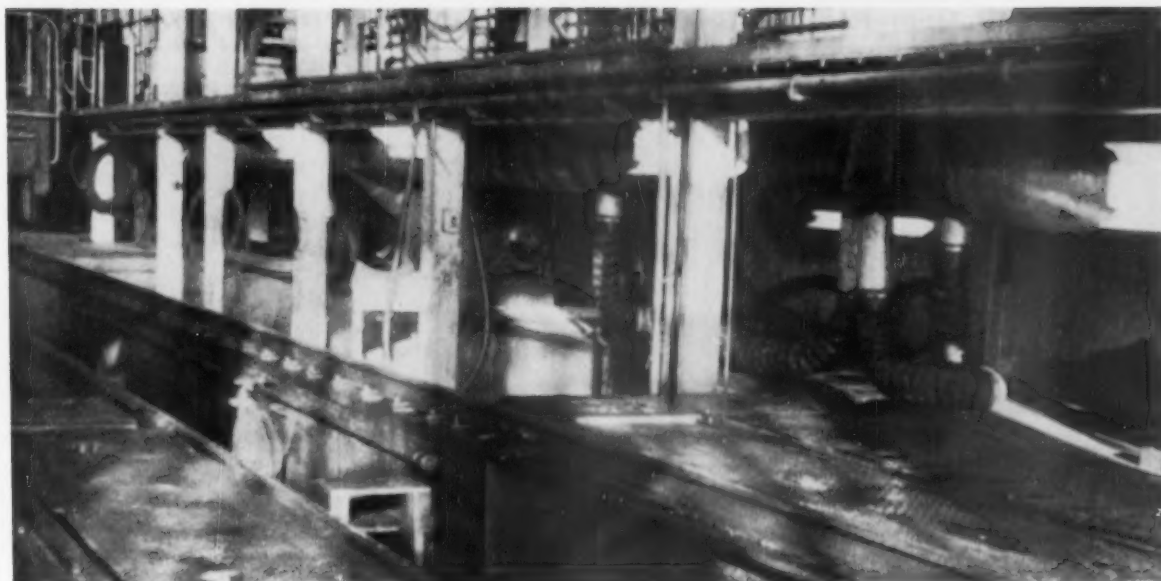
The data for the above curves was taken in an area where the line voltage fluctuations were very erratic. This fluctuating input line voltage caused the d-c test voltage to vary above and below the average voltage impressed on the machine and the micro-ammeter indicated charging and discharging currents as variations occurred in the resultant d-c test voltage. The usual procedure is to record the average indicated value of a wavering meter pointer, and this is normally sufficiently accurate for this type testing in service application. However, in this case, two types of voltage regulators were available and were used—first separately, and later in a series combination to provide maximum steadiness of the recorded values of meter readings.

Conclusions

The railroad industry, by widespread dieselization and electrification, is confronted with major problems in establishing electrical maintenance procedures to reduce to a minimum train delays caused by electrical failures.

The use of d-c maintenance test procedures by the railroad industry is an effective method for improving control over electrical outages caused by insulation failures. The d-c insulation test set described in this paper is a suitable instrument for testing railway electrical equipment.

It is the author's conviction that by the use of high voltage d-c insulation tests, the reliability of important electric transmission and traction equipment can be improved. It is hoped that the data presented will serve as a guide and encourage others to collect and present additional data so that more extensive knowledge of the problem may be gained. It is recommended that test procedures be studied intensively with the objective of establishing a standard method of application of d-c tests on railway electrical equipment.



Fan, header and hoses for traction motors do not interfere with work on or under the elevated shop platform.

How P&WV Gets Rid Of Generator and Traction Motor Dust

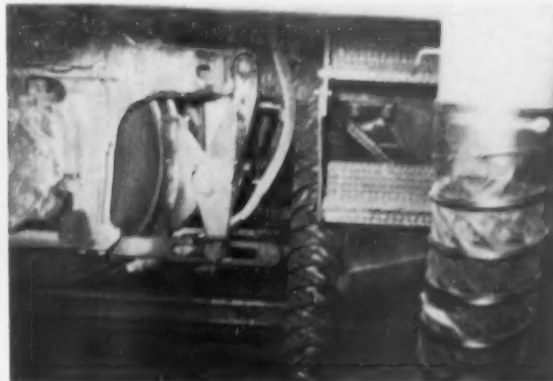
Road dirt and carbon dust are not just moved around when the Pittsburgh & West Virginia's locomotive generators and traction motors are blown with compressed air. Exhaust systems have been installed to assure that the resulting clouds of dust do not settle back on critical electrical surfaces—or even settle elsewhere on the locomotive. In fact, the exhaust systems discharge the dirt outside the shop which simplifies not only locomotive cleaning, but also assures cleaner work areas.

The 22 Fairbanks-Morse, 2,000-hp road switchers are all serviced, maintained and overhauled at Rook, Pa., just southwest of Pittsburgh. All of these four-motored units

have Westinghouse traction equipment. Electrical equipment is blown with compressed air as part of the periodic maintenance program. When undergoing cleaning, traction motors are connected to an exhaust system which develops a vacuum of up to 30-in. of water. This system is built around a centrifugal fan with a 20-hp a-c motor. The fan is rated at 8,000 cfm. A header runs under the elevated work platform for the entire length of the shop and has outlets so that eight traction motors can be reached without moving the units involved. There is also one extra long hose which can be run out to a center track in the shop where work is done on the spare



The flexible hose for removing traction motor dirt readily reaches from the header to the top motor inspection cover.



A flexible hose is applied to the motor from the pit between the rails of the shop track.

How P&WV Gets Rid of Generator Traction Motor Dust continued



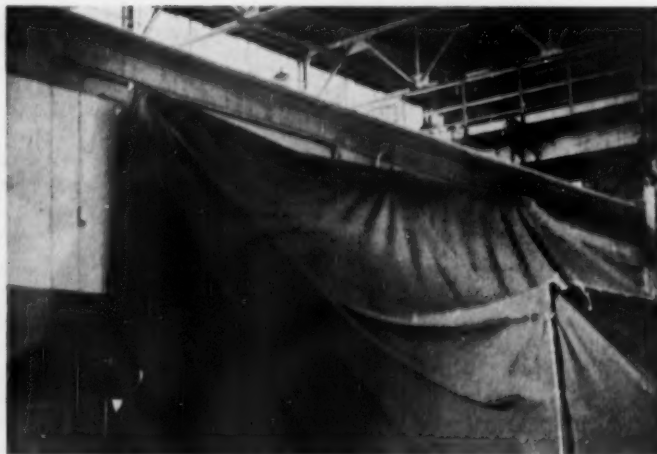
An adapter elbow at the hose end is shown applied to a spare motor. The plate is the size and shape of a traction motor cover.



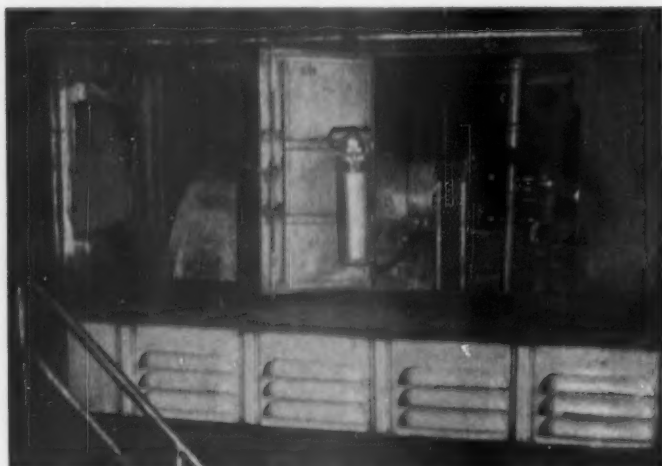
The generator exhaust duct, when folded back, does not interfere with the use of the elevated shop platform.



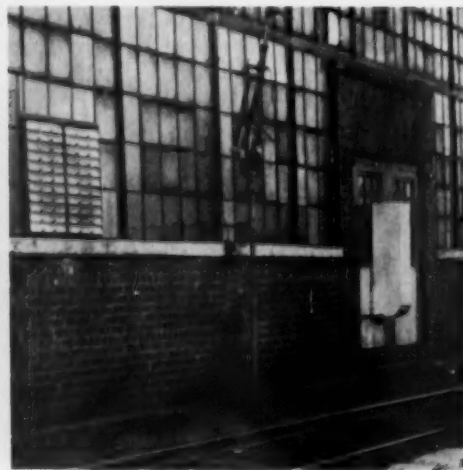
Left: The canvas duct is supported by a metal frame that is hinged so it may be brought out to the side of the



locomotive. Right: Resting against the right side of the hood just ahead of the cab, the duct is ready for the fan to be started.



Left: As seen through the duct from left side of the locomotive, the fan motor is visible just to the right of the exciter. Right: Dirt is discharged outside the shop,



generator dirt coming out through louvers at the left, and motor dirt at the doorway.

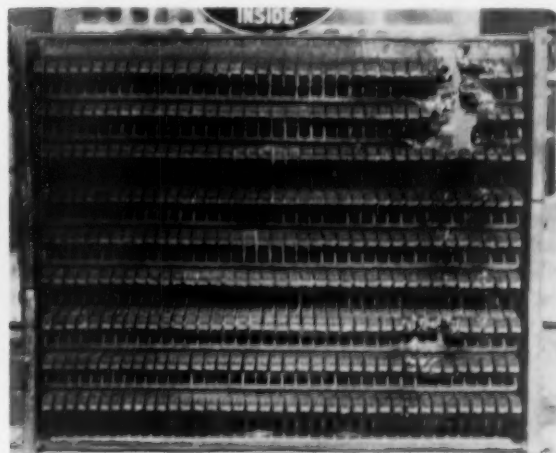
truck maintained by this railroad. Dampers in the individual header outlets can be closed when not in use to assure maximum vacuum on the hoses being used. Reinforced flexible hoses make the connection to the traction motors. At the motor, connection is made with an adapter elbow that fastens over the same hooks which normally hold the traction motor commutator top inspection cover. Blown from below, dirt is loosened from the motor and drawn out through the hose rather than being forced into inaccessible sections or back into the cooling air duct.

The main, exciter and auxiliary generators are cleaned somewhat differently. A propeller-type exhaust fan pulls the dust out through a canvas duct which is fastened over the two hood doors that open on the generator from the engineer's side of these road switchers. The duct is secured on the handrails and at other points. The generators are blown with compressed air from the fireman's side and the dust as it is raised is pulled out of the locomotive hood, through the duct, and finally blown out through the shop wall. The 12,000 cfm propeller fan is driven with a 2 hp a-c motor. Two of these generator exhaust systems have been installed so that two locomotives can be handled at the same time.

B & M Repairs Grids

THE BOSTON AND MAINE is now repairing damaged dynamic breaking resistor grids for its diesel-electric locomotives. When a grid, damaged as the one shown in one of the illustrations, is to be repaired, the damaged sections are first removed and new resistor unit studs are placed in the grid frame. The studs are temporarily held in place by a template, made of a piece of $\frac{3}{4}$ -in. wood board. Holes in the board correspond to holes in the resistor frame and nuts on the threaded ends of the studs hold them in their proper relative position.

While the studs are held by the template, new sections of resistor are placed on the studs and insulated with mica washers. The ends of the grid sections are welded together at the ends. This is done with AWSE 347-15 $\frac{3}{32}$ -in. chrome rod, using 80 amp of current with reversed polarity.



Damaged resistor as it is brought into the shop.

Amps to Ground

CAN YOU TELL US?

What is the maximum leakage current in amperes that can be tolerated on a diesel electric locomotive (a) main generator or high voltage circuit, (b) control (75-volt) or low voltage circuit, and what is the best way to measure this current leakage at the maintenance shop level?

If you have an answer to this question, let us have it. Tell us why you think so. We will publish as many answers as space permits, and will pay for those published at our regular space rates.

AND, DO YOU HAVE ANY PET PROBLEMS OF YOUR OWN?

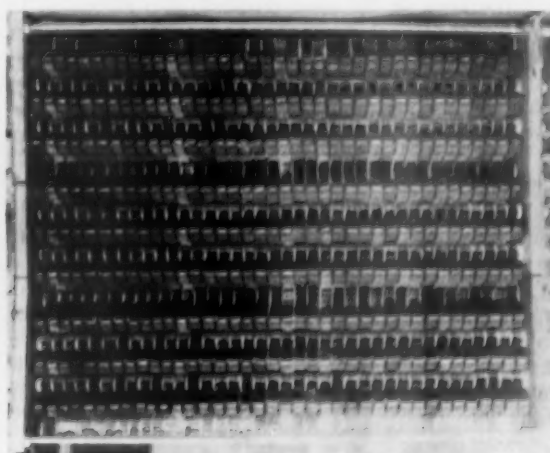
Rate of Rise Better Than Electric Eye

TO THE EDITOR:

The photo-electric method of protection against flashovers proposed by J. W. Brown in the September 1955 issue of *Railway Locomotives and Cars* is a good one, but has been improved upon by recent developments. About 15 years ago, the writer carried out an experiment for this very same purpose. The result was satisfactory in that an incipient flash (short of a flashover) actuated a relay in the photocell circuit and this tripped the circuit breaker.

The idea was not pursued, however, as a "Branchu limiter" type circuit breaker responsive to rate of rise of current provided a more effective protection on the locomotives in question.

E. A. BINNEY
Bradford, England



Completely restored unit ready for return to the locomotive.

Team Work

By Gordon Taylor

This note carries the story of an unusually stubborn case of trouble that had existed on an EMD freight unit for two months before the cause was finally located and corrected. It was one of those cases where the trouble would appear at intervals and then seem to clear itself; but most of the time when the trouble occurred, the crew found that it was necessary to operate the unit by means of manual transition instead of automatic.

Nearly every trip for 60 days, the crews reported trouble somewhere along the line with the automatic transition, and in nearly all cases they reported that they put the unit on manual transition control.

The maintainers combed the control circuit carefully trying to find what would cause failure of automatic transition. None of the crews could think of anything unusual that might give a hint as to the cause of the trouble, and the story each time was that the unit would work properly on manual transition.

The story of the crew was that the load regulator would start swinging back and forth, they would get an intermittent wheel slip light, and the TD relays would telegraph an open and shut condition. This would continue until the unit was removed from the line, or the throttle reduced to idle. After the unit started this condition, the crew stated they would put the unit on manual transition and it would work all right.

The maintainers at the home point were unable to locate anything from the tests in the terminal, and the case was finally assigned to a diesel supervisor.

When he entered the case, the unit had just returned from a trip where it experienced pretty much the usual trouble, but the crew reported that they thought that some of the fuses were involved. The fuses that were reported were carefully checked and found to be good.

Since none of the items reported gave a clue to the cause of the trouble, the supervisor again questioned the road foreman who had last ridden the engine, and the foreman finally recalled that he had heard a crew say when this unit was placed on manual control, it was necessary to operate in either the No. 1 or No. 3 transition. If the unit was placed in No. 2 transition, they would immediately get a wheel slip light.

That statement furnished the clue that solved the problem. It was the first definite information that pointed to the cause of the trouble.

When the supervisor heard that the unit would not operate in No. 2 transition, but would successfully operate in No. 1 and No. 3 transition when placed on manual transition control, he immediately suspected some trouble in the motor shunting circuit. That would be a very natural conclusion, for the reason that in No. 2 and 4



The engineman who is a good reporter is the maintainer's best friend.

transition, a field shunt is involved, and it is not involved in transitions No. 1 and No. 3.

The supervisor then started looking for some flaw in the circuit that would interfere with field shunting of traction motors. In about 10 minutes, he located a loose connection of the RV-4 wire that attaches to the left hand side of the reverser. Cleaning and tightening that connection corrected the trouble, and this particular case could be closed out.

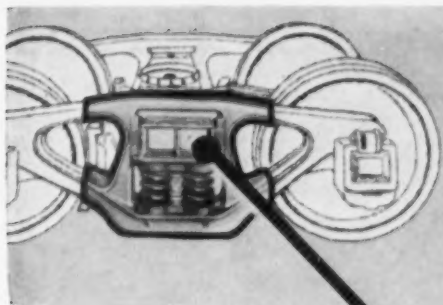
During the time that the unit was causing trouble, the crew was reporting that the unit would work satisfactorily when on manual transition. With that information, the only thing that the maintenance force would check was the automatic interlocks and relays. It needed only the exact statement that when operated under manual transition that trouble would occur with the wheel slip light in transition No. 2. Without that information there was no real clue as the cause of the trouble.

This case emphasizes the importance of crews reporting accurately all of the things that happened when trouble was experienced.

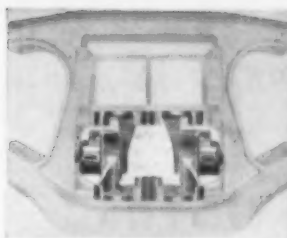
It also emphasizes how important it is for the maintenance force patiently to ask a lot of questions that might remind the crew of something that they failed to think of when they made the report. Many times the crew report the things that impress them as being important, but fail to report something that might seem to be trivial. Often it is those apparently trivial points that are important to the maintainer in assisting him to locate the trouble.

This emphasizes the need of close team work between the operating crews and the maintainers. If all members of the team work together, the trouble can be solved, and, as in this case, many times it can be solved quickly if the needed information is furnished.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

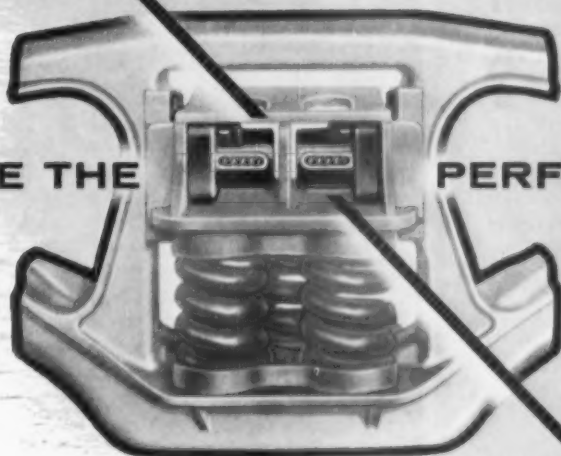


Conventional Freight Car
Truck with Long Travel
A.A.R. All-Coil-Spring
Group and Unit Snubber.
(See illustration below*)



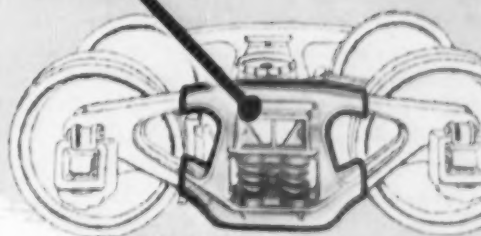
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RIDE STABILIZER PACKAGE
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Freight-Car Truck

The appreciable "performance gap" that has often been noted, between conventional freight car trucks with A.A.R. long travel all-coil-spring group with unit snubber, and freight car trucks with built-in bolster control, is now successfully bridged.

The new Holland RS-1 Ride Stabilizer, a simple unit of radical but proven design, is easily applied to conventional type trucks and gives them riding qualities comparable to the modern high-speed trucks recently tested by the A.A.R.

Write for Bulletin No. 16A for complete technical details.



2 1/2" Travel
Spring Group
with Unit
Snubber
Also with
1 1/2" Travel

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KEY TO RAILROAD PROGRESS . . . ELECTRICAL PIONEERING

G.E.'s traction system gives railroad locomotives maximum performance 3 ways

1-HIGHER CONTINUOUS TRACTIVE EFFORT

Locomotives equipped with G-E traction motors consistently prove their capacity for carrying heavier loads. That's because the GE-752 motor has 15 percent higher continuous tractive effort, at comparable gearings, than any other motor in railroad use.

2-FEWER LOCOMOTIVE ROAD FAILURES

Road failures due to generator flashover are practically unknown on locomotives equipped with G-E traction generators because of the generator's inherently high machine stability, mycalex brush-holder insulators (which unlike the porcelain insulators in other generators will not shatter during flash-over), and a brush-holder shield that drastically reduces damage to the brush rigging.

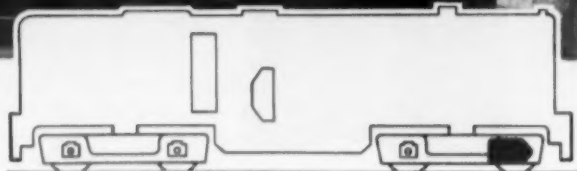
3-MINIMUM MAINTENANCE REQUIREMENTS

It's important to reduce or eliminate the small, continuing, and aggravating maintenance problems that occur on some control systems. In actual tests, G-E control has operated hundreds of thousands of miles in heavy mainline service with complete reliability.

Thirty years ago, General Electric supplied the first traction system—traction motors, generators and control—for the nation's first diesel-electric. Since then, G.E. has developed and is developing and perfecting other products from caboose power equipments to powerful electric and gas turbine-electric locomotives to help the nation's railroads maintain leadership in the transportation business. As the nation grows, and as the railroads grow, G-E research and engineering will be constantly at work to further railroad progress. Ask your G-E Apparatus Sales representative for more information, or write Section 135-1A, Locomotive and Car Equipment Department, Erie, Pa.

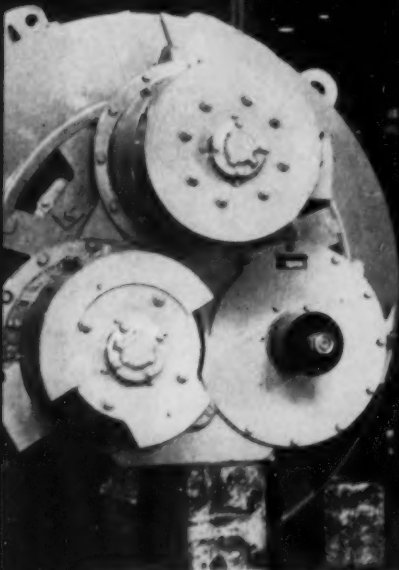
Progress Is Our Most Important Product

GENERAL  ELECTRIC



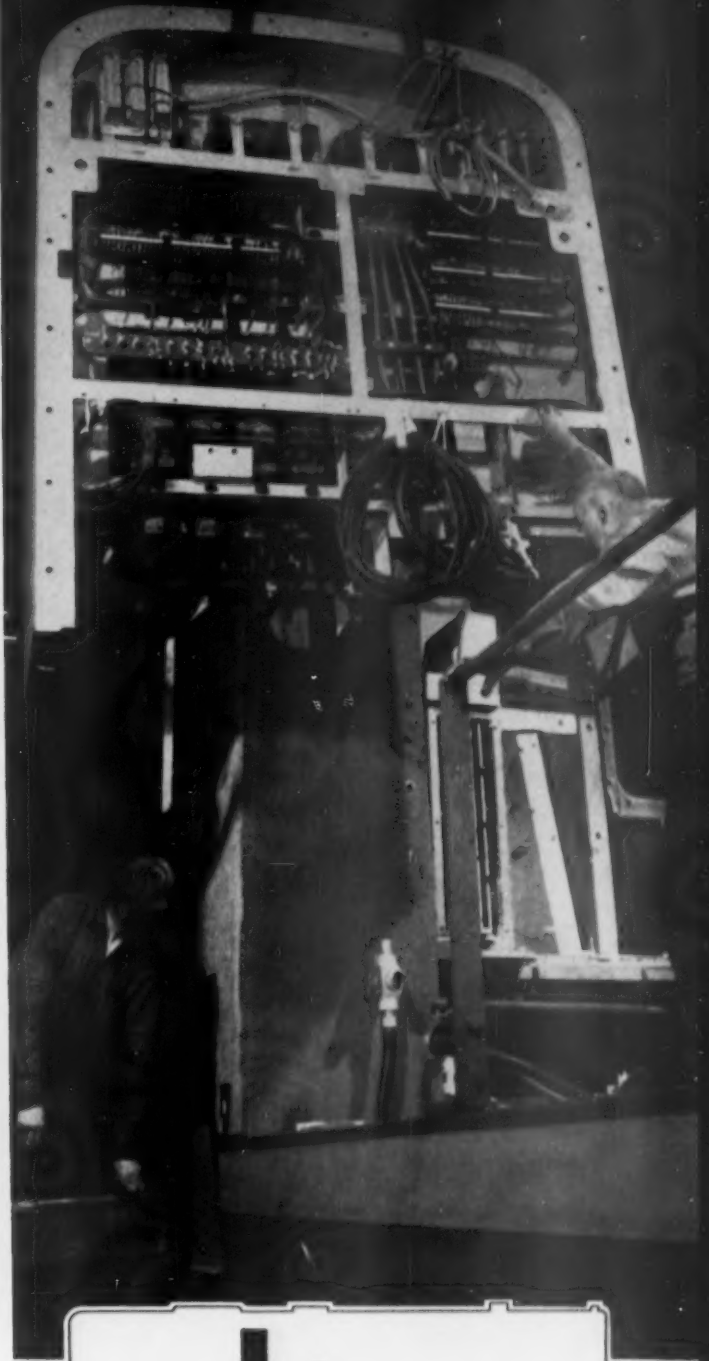
1 G-E TRACTION MOTORS GIVE YOU 15% HIGHER CONTINUOUS TRACTIVE EFFORT

More working material in the GE-752 motor (12 percent heavier than any other motor offered for standard application) means higher ratings. The effective use of additional active copper and iron results in the most powerful traction motor available today.



2 G-E TRACTION GENERATORS ARE BUILT TO REDUCE LOCOMOTIVE ROAD FAILURES

Because they are designed specifically to take flash-overs in stride, G-E traction generators help protect your locomotive from frequent and costly road failures. In most cases, if a G-E generator flashes over, it simply recovers and the locomotive continues its run.



3 G-E CONTROL REQUIRES MINIMUM MAINTENANCE BETWEEN ANNUAL INSPECTIONS

G-E control is simple in construction, with fewer moving parts than other systems. In actual railroad service, locomotives equipped with G-E control have operated from annual inspection to annual inspection without a single detention being charged to the control system.



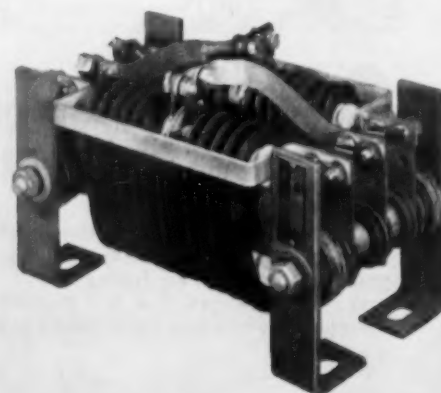
2. G-E RECOMMENDED CARBON BRUSHES are selected for the proper degree of hardness and grain structure to minimize wear and tear on commutator surfaces of your unit.



3. G-E GEARING is designed and quality-control manufactured to carry the heavy starting loads and take the running shock loads encountered in today's heavy railroad service.



4. G-E RESISTORS have floating steel backbones that expand and contract freely with high temperature changes and therefore are not subject to harmful buckling forces.



7 G-E replacement parts for better locomotive operation



1. A HAND PYROMETER is used to check the temperature on this G-E commutator. It has been spun rapidly for hours at a high temperature. This seasoning process prevents future shifting of the commutator segments, eliminates later regrounding and broken brushes.

How G.E. Builds Commutators for Maximum Stability—Long Service Life

The most important factor in commutator life is brush-riding-surface stability. That's why G.E. takes special care to assure accuracy in the two production areas that affect stability most; material and assembly methods.

For wearing surfaces and conducting material, for example, G.E. uses silver-bearing copper. High-grade mica is used for insulation and rigid steel parts for stability. Just the right amount of binder is added to the mica to reduce slipping and shrinking. Result—a more stable brush-riding surface.

The highest degree of skilled workmanship is essential during the assembly process. Commutator belts are uniformly tightened with torque-wrench accuracy. And to complete the job, a high-tonnage press sets the segments firmly and "permanently" in place. Again, the result is more stability—longer life.

To get the performance you originally bought, always specify genuine G-E commutators and parts. They're designed as an integral component of your traction equipment. General Electric Co., Locomotive & Car Equipment Dept., Erie, Pa.

12B-24

Progress Is Our Most Important Product

GENERAL  ELECTRIC

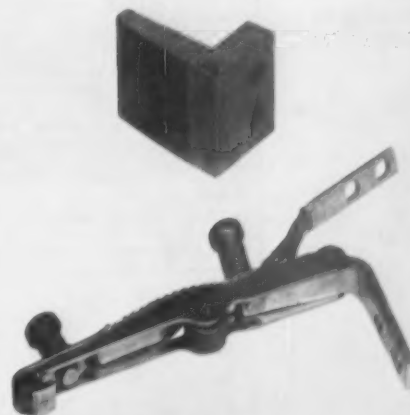
5. G-E MOTOR SUSPENSION BEARINGS give you longer service life—have a built-in oil-return feature which can save up to \$85.00 of operating costs per locomotive unit, each year.



6. G-E ARMATURE COILS are available as part of complete rewind kits for your convenience. Every coil is dimensionally accurate and quality insulated for longer life.

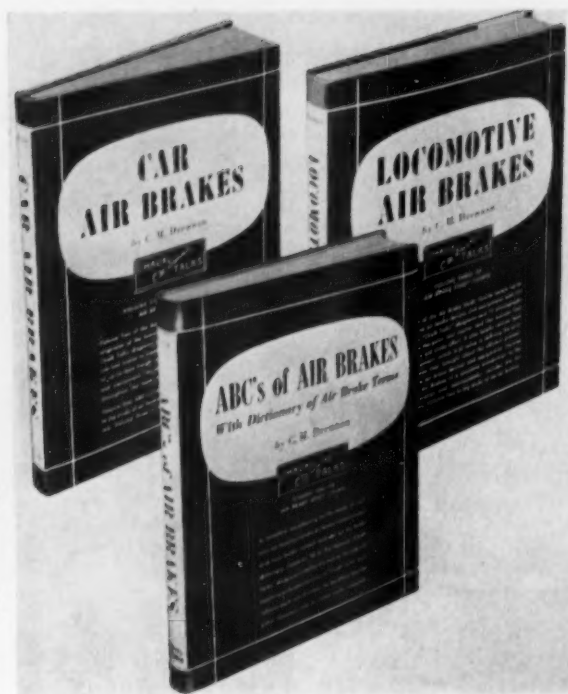


7. G-E CONTACT PARTS break circuits quickly with a minimum metal transfer. This assures you of long service life from these parts.



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Written by C. M. Drennan, famed air brake teacher formerly with Westinghouse, these books utilize Mr. Drennan's tested and effective "Chalk Talks" method consisting of clear, simplified "blackboard" drawings that make the function of every part easily understood. Many photographs of equipment are also included. Interspersed throughout all three volumes are quizzes for review and testing of the student's progress.

Vol. 1 (ABC's of Air Brakes) covers friction and braking ratio and freight and passenger train brake control; function and operation of pistons, valves, electric controls and other components. Dictionary of words and terms used in air brake work.

Vol. 2 (Car Air Brakes) covers all car air brake valves and other devices; freight car brakes—AB, ABLC and AC. Passenger car brakes—D-22-P; electro-pneumatic; speed-governor control; Decelostat equipment; universal control.

Vol. 3 (Locomotive Air

Brakes) is a thorough exposition of all locomotive brake equipments. Covers air compressors, relay valves and miscellaneous devices. ET equipments and modifications and 24-RL equipment; equipments with electric controls; braking force control.

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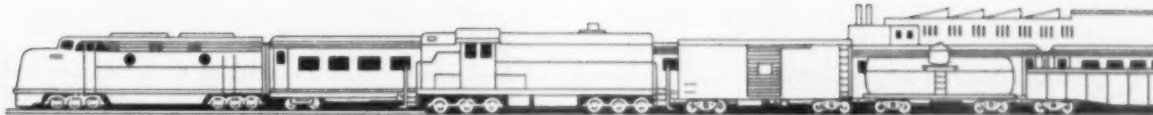
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Problem Page . . .



. . . WHERE THE TOUGH ONES ARE HANDLED

E. M. Vandiver, *Missouri Pacific master mechanic at Monroe, La.*, submitted the entry chosen as the name for this section of *Railway Locomotives and Cars*. Selection of the winning entry from the many submitted was made by vote of our railroader subscription agents located on most of the major railroads across the country.

Problem Pages are to carry your operating and maintenance problems that relate to locomotives, cars and shops. It is intended that topics for discussion should *come from you*. It is your discussions of these topics which will make this section interesting and worthwhile. We pay for questions and discussions accepted for publication. When do we hear from you?

Lining Box Cars

For ordinary car repair operations, are there ways to speed and mechanize the application of box car lining?

SAVINGS WITH SUBASSEMBLIES, *Canadian National Railways*. Car-lining panels pre-assembled on jig tables at CNR car shops have reduced lumber waste to a minimum, and reduced application costs while affecting a considerable saving in time. These panels are sized so that two are required on each side of the door opening and a total of eight are needed to line a box car.

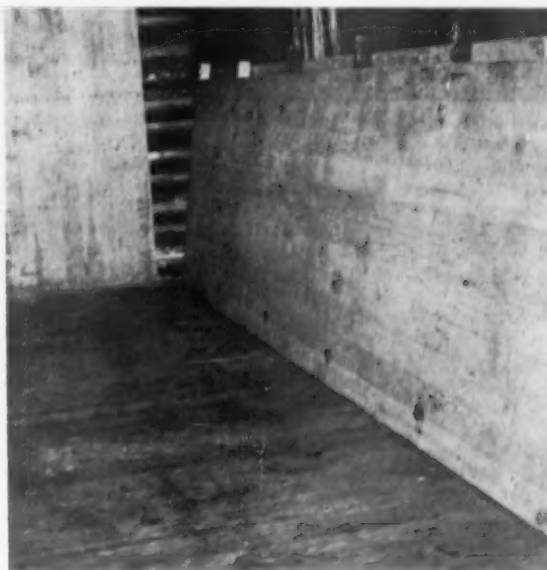
The jig table is large enough to accommodate the largest panel and is equipped with three 10-in. air cylinders which are operated to clamp the assembly prior to nailing. A fourth cylinder is built under the table to raise the assembled panel so that it can be easily re-

moved. Lining lumber is pre-cut in lengths to suit. It is placed on the jig table with joints located opposite marks that indicate the location of the furring posts. The lining is drawn up square against a movable straight edge which may be placed at either end of the table. This straight edge acts as a door post and eliminates the necessity trimming the panels to fit each end of the car.

The air-operated clamps then draw the lining together tightly. Nailing strips which do not interfere with the furring posts are then nailed on to form a completed assembly. Clamps are released and the lift cylinder raises the panel. During application, the bottom panel is temporarily nailed to the furring and door posts with its straight edge against the door post. The top panel is then put into position and the entire nailing operation is completed.



Jig table holds completed car lining panel. Nailing strips are not located on the joints. These joints will be backed up by the furring strips in the car structure when the panel is applied inside the car.



Panels make possible faster and more economical lining on the Canadian National. Lower panel is tacked in place and the second panel is then installed over it. The entire nailing operation is then completed.

Questions and Answers

6-SL Brake Equipment

This is a new series of Questions and Answers pertaining to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

W38-Q—What serves to hold the check valve seated?
A—With brake pipe pressure below the piston and equal to equalizing reservoir pressure above the piston, the spring holds the check valve on its seat.

W39-Q—Under what conditions is the check valve un-seated?
A—When equalizing reservoir pressure rises above brake pipe pressure.

W40-Q—When does this condition generally occur, and why?
A—This condition generally occurs during release of the brakes due to rapid charging of the relatively small equalizing reservoir volume.

W41-Q—What then takes place?
A—The excess pressure moves the check valve from its seat. Equalizing reservoir pressure then flows past the open check valve (through a connecting port at the top of the piston) to the spring cavity and thence, through drilled holes in the valve stem to the brake pipe.

(Pamphlet 5046-15, page 15)

W42-Q—How long does the check valve remain open?
A—When the pressures are equalized, the spring seats the valve and closes the by-pass. This serves to keep the two pressures equal.

W43-Q—What are the automatic brake valve handle positions?
A—Beginning at the extreme left: Running, Holding, Lap, Service and Emergency. Independent Brake Valve Portion—Fig. 6 and Plate 1.

W44-Q—What does the independent brake valve portion consist of?
A—A body in which are: independent quick release valve (97), independent exhaust valve, application check valve (79b) and camshaft (76).

(Pamphlet 5046-15, page 16)

W45-Q—What is attached to the independent brake valve body?
A—Attached to the brake body are: the self-lapping unit (118), Fig. 6, and housing (88) for the brake valve handle 109-Fig. 7.

W46-Q—What is contained in the self-lapping unit?
A—Self-lapping exhaust valve and piston, inlet valve and the necessary operating levers which function as controlled by a cam on the handle shaft.

W47-Q—What is the function of the self-lapping inlet valve (122)?

A—To supply air for controlling the locomotive brake when actuated by the cam on brake valve shaft (76) Fig. 7.

W48-Q—What is the function of the self-lapping exhaust valve (134)?
A—To connect the brake valve chamber to atmosphere as controlled by independent exhaust valve (97a).

W49-Q—How does the independent quick release valve (97) function?
A—Provides for a quick release of the locomotive brake when applied by the automatic brake valve. It is done by depressing the independent brake valve handle in running position.

W50-Q—How does independent exhaust valve (97a) function?
A—It provides an atmospheric opening for the self-lapping exhaust valve during operation of the independent brake.

W51-Q—What is the purpose of the independent application check valve?
A—To prevent back flow from application cylinder pipe to the control chamber of independent brake valve with automatic brake applied.

W52-Q—What are the handle positions of the independent brake valve?
A—Running position and brake application zone.

(Instruction Pamphlet 5046-15, page 17)

W53-Q—What do the Sander and Bell Ringer Valves, Fig. 6, consist of?
A—The sander and bell ringer valves are similar, each having an operating handle, rotary valve key and rotary valve.

W54-Q—What are the positions of the sander valve?
A—The sander valve has three positions of the handle, beginning at the extreme left: reverse sanding, neutral and forward sanding. The handle has a spring latch which locates the handle in position.

W55-Q—What are the connections with sander valve in neutral position?
A—In neutral position, the ports from the forward and reverse sanding pipes are connected to the exhaust port of the sander valve by the rotary valve ports.

W56-Q—What are the connections in forward sanding position?
A—The rotary valve ports connect the reverse sanding pipe port to the exhaust port and main reservoir air from above the rotary valve goes to the forward sanding port, supplying air for forward sanding.

W57-Q—What are the connections in reverse sanding position?
A—The rotary valve connects the forward sanding port to exhaust and main reservoir air from above the rotary valve to the reverse sanding pipe port, supplying air pressure for reverse sanding.

W58-Q—Is there any warning to the engineman when the sanding valve handle is in operating position?
A—Yes. In both forward and reverse sanding, a choked

Questions and Answers

port in the sander valve rotary valve connects main reservoir air to the exhaust, sounding a warning as long as the sander valve handle remains in either position.

- W59-Q—What are the positions of the bell ringer valve?**
A—The bell ringer valve has two handle positions; Bell ringing position at the extreme left and neutral to the right.

(Pamphlet 5046-15, page 18)

- W60-Q—Describe the two positions of the bell ringer valve.**
A—In neutral position, the port from the bell ringer pipe is connected to the exhaust port in the valve body by the rotary valve. In bell ringing position the rotary valve port connects main reservoir air from above the rotary valve to the bell ringer pipe port, supplying air pressure for operation of the bell ringer.

Brake Pipe Cut-out Cock

- W61-Q—What type of brake pipe cut-out cock is used with the basic 6-SL brake equipment and what is its function?**

A—A two-position brake pipe cut-out cock, located on the side of the brake valve body, is used to open or close the passage between the brake valve and brake pipe.

- W62-Q—What is the set-up in double heading service?**

A—In double heading service, or when more than one locomotive is used in a train, the two position cock on the second unit must be closed and the handles of the automatic and independent brake valves placed in Running position on all locomotives except the one handling the train brakes.

- W63-Q—What braking control has the engineman on the locomotive not in control of the train brakes?**

A—The engineman on such locomotives can apply or release his locomotive brakes independently of the train brakes by proper manipulation of the independent brake valve handle.

(D-24-B Feed Valve, Fig. 9-10-11)

- W64-Q—What type of feed valve is standard for the 6-SL brake equipment?**

A—The D-24-B feed valve.

- W65-Q—What portions does the feed valve contain?**

A—The Regulating and Supply portions.

- W66-Q—What does the regulating portion consist of?**

A—A pressure adjusting handle (26), regulating spring (21), bellows diaphragm (19), disc regulating valve (27), spring (32).

- W67-Q—Describe the supply portion.**

A—The supply portion consists of: piston (7), supply valve (11), and spring (9).

(Pamphlet 5046-15, page 19)

- W68-Q—How is the D-24-BB feed valve adjusted?**

A—Like previous types, by turning adjusting handle clockwise to increase and counter-clockwise to lower the pressure setting.

- W69-Q—What function is performed by the disc regulating valve?**

A—Permits air at the required pressure to flow to the supply portion, controlling the air pressure delivered by the feed valve.

General Motors

Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

- G380-Q—What should be the position of above valves with a long freight train?**

A—"FRGT" position on the operating "A" unit and the "B" unit and "FRGT LAP" on the trailing "A" unit.

(Manual 2310, page 203)

- G381-Q—How will this affect the brake action?**

A—This will effect a Controlled Emergency action on each unit.

- G382-Q—How can the Controlled Emergency action be nullified on the operating "A" unit?**

A—By placing the independent brake valve in full application position at the same time the automatic brake valve is placed in emergency position.

- G383-Q—How should the unit selector switch be set at this time if the locomotive has dynamic brake?**

A—Set the unit selector switch to correspond with the number of units in the consist (1, 2, 3 or 4).

- G384-Q—In what position should the independent brake valve be placed?**

A—In full application position.

- G385-Q—In the engine room with the engines running, what should be checked first?**

A—Check for oil, water and fuel leaks.

- G386-Q—What check should follow?**

A—Check gauges, indicators and switches as listed. (Fig. 2-2 Page 206)

- G387-Q—Referring to above list, what may be the trouble with the starting contactors, and what would be the result?**

A—Contactors may be stuck closed. This will cause a unit failure.

- G388-Q—What attention should be given the battery ammeter?**

A—Normally it will indicate zero or a slight charge. Make certain that a continual discharge is not indicated.

- G389-Q—What attention must be given to control air pressure?**

A—The gauge should read 90, plus or minus 3 pounds. Failure to maintain this pressure will result in a unit failure.

- G390-Q—What check should be made in connection with the ground relay?**

A—Make sure that the ground relay is not tripped. If the ground relay trips the white needle in the relay will point to a red dot, a yellow light will come on and the engine speed will stay in Idle unless the throttle is placed in the 5th or 6th notch, in which case the engine will stop.

- G391-Q—What should the main reservoir and air compressor intercooler pressures be?**

Questions and Answers

A—Main reservoir, 130 to 140 psi and intercooler 30 psi when pumping.

G392-Q—What should the air compressor oil pressure be?
A—A minimum of 10 psi at idle speed (275 RPM).

G393-Q—What should the lube oil level be?
A—Between "Low" and "Full" on either bayonet gauge.

G394-Q—How are engine speed and fuel consumption indicated?
A—By the two pointers on the cover of the engine governor. Improper indication of these pointers may show a unit failure.

G395-Q—What should the governor oil level be?
A—The governor oil level should be between the two lines on the governor oil gauge.

G396-Q—What should the water temperature be?
A—120 to 165 degrees, plus or minus 15 degrees. In the event of high cooling water temperature, the high temperature alarm switch will close. This causes a red light to show in the unit affected and rings the alarm bells in all units.

G397-Q—What must be the position of the isolation switch?
A—In RUN position except when other units are in dynamic braking.

G398-Q—What should the lube oil pressure be?
A—Oil pressure at 800 RPM is normally 35 to 45 psi and should not drop below 20 psi. At idle, the pressure should be at least 6 psi.

G399-Q—Can low oil pressure lead to a unit failure?
A—Yes, in the event of dangerously low oil pressure the engine will automatically be stopped. Yellow and blue lights will be lit.

G400-Q—Does the fuel gauge located on the engine control and instrument panel show fuel level continuously?
A—No. A push button needle valve directly below the gauge must be pushed to get the fuel level indication on the gauge.

G401-Q—How may the operating water levels be observed?
A—The operating water levels are stenciled on the water tank next to the water gauge glasses. Minimum and maximum water levels with engine running or stopped are indicated.

G402-Q—What consideration should be given water levels?
A—The engine should never be operated with the water below the low water level.

G403-Q—What should be done in the event that progressive lowering of water in the gauge glass occurs?
A—This indicates a leak in the cooling system and should be reported.

G404-Q—What should be done if the engine overspeed device is tripped?
A—It must be reset manually by pulling the lever counter-clockwise until it latches in order to get the engine started.

G405-Q—What should be checked in connection with the flow of fuel?
A—A good flow of fuel (clear and free of bubbles) should be indicated in the fuel return sight glass.

G406-Q—What switch should be checked at this time?

A—Check position of AUTO-MAN transition cut-out switch if used.

(Manual 2310, page 203)

G407-Q—What must be done if any unit in the consist is to be operated in manual transition?
A—The transition lever must be used to effect transition in that unit or units.

G408-Q—What should be done to prepare the air brake system for operation?
A—1. Drain condensation from the system. 2. Position controlled emergency cock on control valve in B units, and set rotair valves in their proper position. 3. See that brake valves are properly cut in or out as required. 4. Release hand brake in each unit.

Precautions Before Starting Engine

(Manual 2310, page 204)

G409-Q—Name some of the items which should be checked before starting the engine.
A—Check operation of all valves and drains in cooling and lube oil systems and air reservoirs. Check engine cooling water level.

G410-Q—What oil supplies should be checked?
A—Engine crank case, engine governor and air compressor.

G411-Q—What other action should be taken?
A—1. Close all switches in distribution panel and check to see that all fuses are in place. 2. At engineman's control station push in the control and fuel pump switches (ON position). 3. Place Independent Brake Valve in full application position. 4. Check PCS. light. 5. Remove reverse lever from the controller.

To Start Engine

(Manual 2310, page 207)

G412-Q—What must be done when ready to start the engine?
A—Turn on fuel pump switch at engine control panel.

G413-Q—What check should be made immediately?
A—Check for fuel flow through sight glass on fuel filter nearest engine. Check setting of overspeed trip. Check governor low oil pressure indicator.

G414-Q—What should follow?
A—Push in and hold layshaft so that the governor fuel indicating pointer is at approximately "16".

G415-Q—What action should then be taken?
A—Push in engine start button until engine completely starts. It should start in not more than 15 seconds.

G416-Q—In what position must the Isolation switch be before the start button is effective?
A—The Isolation switch must be in the START position.

G417-Q—With the engine running, what checks must now be made?
A—Check oil pressure, starting contactor interlock and ground relay.

G418-Q—How long should the engine be idled before working it?
A—Idle engine until water temperature is approximately 120 degrees.

PERSONAL MENTION

(Continued from page 18)



R. E. Franklin

appointed assistant vice-president, mechanical, at Washington, D. C. *Born:* December 3, 1919, at Birmingham, Ala. *Education:* Phillips High School, Birmingham. *Career:* Became a laborer on the Southern in September 1937. Subsequently machinist helper, machinist apprentice, machinist, assistant erecting shop foreman at Birmingham; erecting shop foreman at Somerset, Ky.; general foreman at Danville, Ky.; general foreman at Ludlow, Ky.; master mechanic at Meridian, Miss.; master mechanic at Birmingham, and superintendent maintenance equipment (December 1952).



R. S. Hamilton

ROBERT S. HAMILTON, plans engineer (mechanical), appointed to newly created position of assistant chief mechanical officer, with headquarters at Washington, D. C. *Born:* Benton, Ill., February 7, 1919. *Education:* Illinois Institute of Technology. *Career:* Began in 1941 as assistant to superintendent, Elwood Ordnance Plant. 1949-52 on special assignment for Electro-Motive Division, General Motors Corporation, then management consultant for Arthur Young & Co. Appointed plans engineer, Southern, in 1954.



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Southern (Continued)

WILLIAM M. GADY appointed foreman (night) at Greenville, S. C.

CLINTON J. McMICHEN appointed assistant foreman enginehouse at Columbia, S. C.

Obituary

PERCY HAUSER, retired foreman mechanical engineer's office, Pennsylvania, died December 23.

**SUPPLY
TRADE NOTES**

CORNELL DUBILIER ELECTRIC CORPORATION.—William C. Otto has been appointed industrial sales manager, Indianapolis division, at Indianapolis. Mr. Otto was formerly chief engineer of the division.

The corporation's mid-west sales office has been moved to 5247 West Diversey avenue, Chicago.

MOTOR WHEEL CORPORATION.—Frank D. Jackson, a member of the sales staff of Motor Wheel, has been appointed sales manager, Pressed Steel division.



G. Smith

GRIFFIN WHEEL COMPANY.—Goff Smith, executive vice-president, has been elected president, to succeed Edmund Q. Sylvester, resigned. Samuel C. Prest, operating manager, and J. Ross Drever, director of research, have been elected vice-presidents.

H. K. PORTER COMPANY, W-S FITTINGS Division.—Watson-Stillman Fittings Division has changed its name to W-S Fittings Division.

TURCO PRODUCTS, INC. — Joseph Horacek, Jr., has joined Turco as assistant sales manager.

BUCKEYE STEEL CASTINGS COMPANY.—E. W. Hoster, Jr., formerly with Jones & Loughlin Steel Co., has joined the sales staff of Buckeye at Columbus, Ohio.

YOUNGSTOWN STEEL DOOR COMPANY.—John P. McWilliams, board chair-

"Air lock" difficulty practically eliminated

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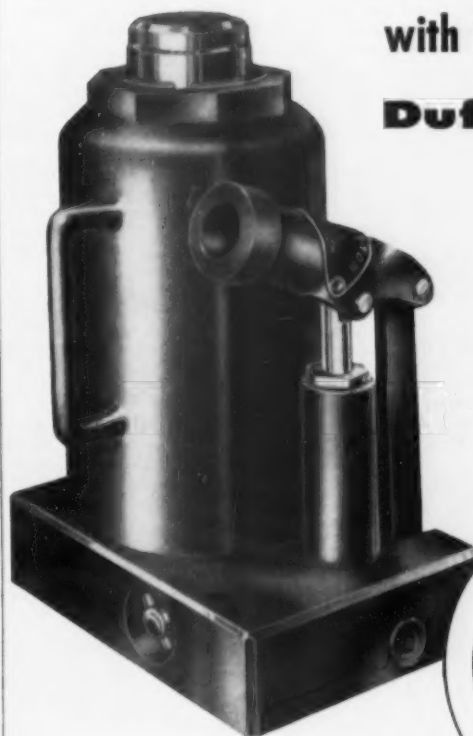
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Manufacturers' Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number(s) on coupon below to receive desired information. Requests will be forwarded direct by the manufacturers.

1. **TRAIN X.** Pullman-Standard. 8-page illustrated brochure (J-2579) "A Preview of Pullman-Standard's Train X, The New Train The Nation's Leading Carbuilder is Building" discusses and diagrams such features as: low center of gravity, roll compensating design, bidirectional air-glide ride, arrangements for increased passenger pleasure.
2. **BATTERIES.** C & D Batteries. 4-page pamphlet (AC-546) "C&D Slyver-Clad Batteries for Car Lighting and Air Conditioning."
3. **LOCOMOTIVE TRACTION SYSTEM.** General Electric. 12-page bulletin (GEA 6085) "General Electric's Traction System Gives You Maximum Locomotive Performance" illustrated with photos, drawings, and graphs, discusses major components of G-E traction system.
4. **BRUSHES.** National Carbon. 8-page pocket-sized pamphlet "Announcing the First General Purpose Industrial Brush, National N-4" describes and illustrates general purpose industrial motor and generator brush.
5. **GRATING AND TREADS.** Klemp Metal Grating. Brochure contains illustrated report on usage of Steel, Aluminum and Stainless Grating and Stair Treads, discusses various types of electroforged welded grating.
6. **GAS CUTTER.** Air Reduction. 20-page catalog (804A) describes and illustrates operating and construction features of Airco #50 Travograph oxy-acetylene multiple-torch, shape-cutting machine.
7. **STEAM CLEANERS.** Malsbary Mfg. 4-page catalog (156) "High Pressure Combination and Steam Vapor Cleaners" describes and depicts the Malsbary steam cleaner line, tells difference between high pressure combination HPC models, steam vapor models, and fireless steam cleaners.
8. **WIRE ROPE FITTINGS.** American Hoist & Derrick. 28-page catalog (950-1) "Laughlin Fittings For Wire Rope and Chain" includes engineering data, charts for each of fitting types.
9. **WRITE-ON TAPE.** Labelon Tape. 2 pocket-size folders discuss and illustrate Labelon tapes. Form L-6 describes new "Write-on-it" Tape, features number of uses, includes actual sample. Form P-1 describes extensive line of printed tapes; describes many uses for both acetate film and flatback paper printed tape types.
10. **MASKING.** By-Buk Co. 4-page folder (M-12) "Spray Paint Masks and Masking Specialties" describes and illustrates masking devices for industrial product finishing.
11. **CARBON DIOXIDE WELDING.** Air Reduction. 12-page reprint "Carbon-Dioxide-Shielded Consumable-Electrode Arc Welding" by G. R. Rothschild deals with methods of supplying and flow characteristics of carbon dioxide.
12. **ELECTRICAL WIRE & CABLE.** Okonite. 16-page general catalog (1096) lists trade names, products and applications, of Okonite electrical wire and cable; includes cable selection charts.
13. **SILICONE PRODUCTS.** Dow Corning. 12-page bulletin (1-110) "1956 Reference Guide to Dow Corning Silicone Products" describes 150 generally used silicone products, 18 introduced during past year.
14. **HOSES & DUCTS.** Flexaust Co. 6-page bulletin (60) describes, illustrates, shows typical uses, gives prices for Flexaust hoses and Portovent ducts.
15. **HARDNESS CONVERSION.** International Nickel. Handy, wallet-size celluloid card gives relationship between Brinell, DPH (Vickers), Rockwell and Shore Scleroscope hardness values and corresponding tensile strengths of steels.
16. **DRIVE MAINTENANCE.** Reliance Electric & Engineering. 4-page folder (H-2104) "How To Care For Jr." describes and illustrates program for keeping Reliance V*S Jr. drives operating; explains complete line of services and parts available for these electronic variable-speed drives.
17. **PIPING FABRICATION.** Mercury Piping. 6-page illustrated brochure shows Mercury's operations in fabrication and erection of low and high pressure piping.
18. **CENTRIFUGAL FANS.** Chicago Blower. Bulletin (A-102) describes and illustrates the Chicago line of Airfoil Centrifugal Fans; includes design features and applications.
19. **HYDRAULIC POWER UNITS.** Ex-Cell-O. 20-page bulletin (45352) "Ex-Cell-O Quill-Type Hydraulic Power Units For Quality Work at Low Cost on Special Purpose Production Machines" describes and illustrates the units and their use.

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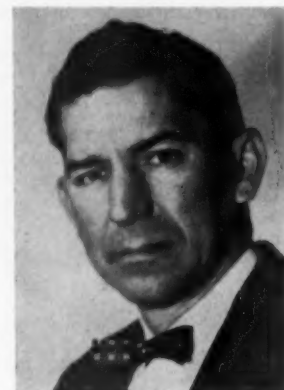
City Zone State

man since 1948, and president from 1933 to 1948, has been re-elected president. *Emmett P. Dowling* has been appointed assistant president, a new position.

CAMEL SALES COMPANY.—*Edward E. Robbins* has been elected chairman of the board; *Earl C. Browne*, president, and *L. C. Voss*, vice-president, of Camel, a wholly owned subsidiary of Youngstown Steel Door.

New head of Camel Company, Ltd., is *F. C. Heinen* of New York. Mr. Voss has been named vice-president of this company also.

JOSEPH T. RYERSON & SON, INC.—Ryerson has agreed to purchase from the Seaboard Air Line an 11½-acre tract at Pinoka, N. C., immediately northwest of Charlotte, as the site for a new steel service plant, to be erected in the near future.



G. C. Brecht

GREENVILLE STEEL CAR COMPANY.—*George C. Brecht*, assistant to vice-president, sales, has been appointed general manager of sales, succeeding the late *A. J. Rose*, vice-president in charge of sales. *John T. Egbert, Jr.*, office manager of sales, has been appointed assistant to Mr. Brecht.

AEROQUIP CORPORATION.—A new warehouse has been opened at 102 Express street, Dallas, to serve the south and southwest area.

AMERICAN STEEL FOUNDRIES.—The general office of ASF is now at Prudential Plaza, Chicago.

PANTASOTE COMPANY.—*Gordon H. Proffitt* has been appointed transportation sales representative of Pantasote for the West Coast area at San Francisco, succeeding *Carl E. Danelson* of Los Angeles, who died October 28.

MILLER LUBRICATOR COMPANY.—Construction has begun on a one-story factory and office building, to have an area of approximately 30,000 sq ft. Production facilities will be automatized to a high degree. Completion is scheduled for early spring.

BEAR MANUFACTURING COMPANY.—T-Z Railway Equipment Company, Chicago, has been appointed exclusive repre-

representative of Bear balancing machines for the railway industry.

SUPERIOR HAND BRAKE COMPANY.—Superior has moved into its new office adjacent to the shop at Dundee, Ill.

AIR REDUCTION SALES COMPANY.—*J. W. Kenefic*, superintendent railroad service, western region (Chicago office), has retired after 36 years with the company. *R. L. Rex*, superintendent railroad service, eastern region, is appointed superintendent railroad service, Railroad Department. Mr. Rex will remain in New York.

RAILROAD PARTS SERVICE COMPANY.—*Ray W. Preikschat & Son*, Chicago, has been appointed national representative contacting railroads in the United States.

DUFF-NORTON COMPANY.—*Richard G. Nolte* has been appointed vice-president and assistant to president.

TIMKEN ROLLER BEARING COMPANY.—Timken has announced that the \$5 million appropriated early last year to manufacture railway bearings will be spent at the Columbus plant. Work on the new railroad-bearing production unit is under way. On completion, about January 1957, it will have an annual capacity of 160,000 bearings.

LESLIE COMPANY.—*Russell W. Boettiger*, sales manager, has been appointed director of sales.

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Works in seconds! **Loosens Rusted Bolts, nuts, screws, 'frozen' parts . . . without breakage!**



LIQUID WRENCH

A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

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R. G. Altizer



R. D. Baker



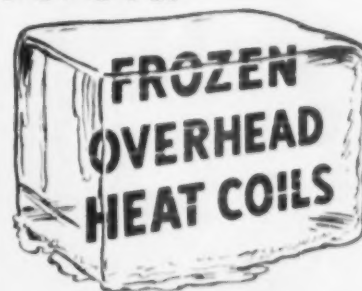
C. V. Kinsey

MAGNUS METAL CORPORATION.—*R. G. Altizer* has been appointed assistant to the president. *Ralph D. Baker* has been named eastern sales manager, covering the central and southern regions, and *Charles V. Kinsey* has been named district sales manager for New York and New England.

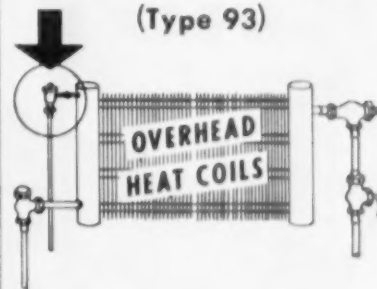
UNION CARBIDE & CARBON CORP.—*Silicones Division* has been formed to take over the development, manufacture and sale of silicone products, assuming responsibilities previously handled by the Linde Air Products Company. *William B. Humes*, vice-president of Union Carbide Canada Limited, has been appointed president of the new division.

LINDE AIR PRODUCTS COMPANY.—*E. B. Suydam*, vice-president, has been appointed

Avoid



with **OGONTZ THERMAL VENT and VACUUM BREAKER (Type 93)**



If you were ever plagued by frozen overhead heat coils, know this: No coil equipped with a No. 93 Thermal Vent has ever frozen!

There is a simple cause of coil freezing: it's vacuum, which traps condensate in the lower tubes. By preventing vacuum, the No. 93 Vent eliminates condensate: there is nothing to freeze!

And the No. 93 vent has no operating complications. Cold, it remains open to allow escape of air in front of steam pressure. After air is expelled and the vent heated by entering steam, the No. 93 shuts tight and remains so until cooled again.

Send for Bulletin 256

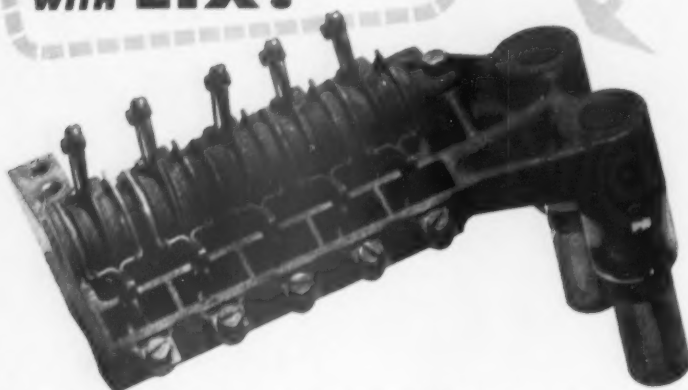
It contains valuable suggestions for preventing freeze-up in car-heating systems and describes the function, operation and installation of the Ogontz Type 93 Thermal Vent and Vacuum Breaker. A copy is yours for the asking.

OGONTZ CONTROLS CO.

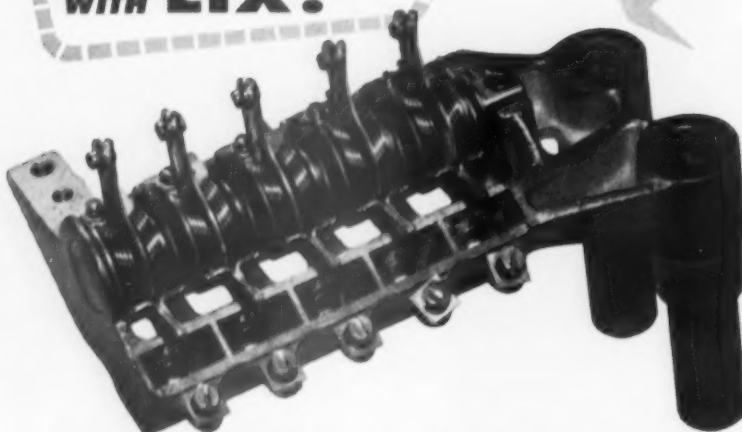
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Use LIX Diesel Klean Heavy for cleaning aluminum and cast iron pistons, fuel filters, cylinder heads, brush holders, airbrake assemblies, and etc.

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(OF MISSOURI)**

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"Leadership in Industrial Cleaning"

president of Linde, succeeding T. D. Cartledge, who continues as a vice-president of Union Carbide. William M. Haile has been appointed a vice-president of Linde. Mr. Haile was previously manager of the Eastern Division of Linde.



H. E. Connors

AMERICAN BRAKE SHOE COMPANY, NATIONAL BEARING DIVISION.—Harry E. Connors, district sales manager at St. Paul, has been appointed general manager railroad sales, at Chicago.



D. Herendeen

C & D BATTERIES, INC.—Don Herendeen has been named Baltimore representative for the sales and service of C & D batteries.

OKONITE COMPANY.—A sales office and warehouse has been established in Syracuse, N. Y., to operate in conjunction with D. K. Post & Co., manufacturers' agent, at 216 Burnet street. Walter E. Garrigan has been appointed manager of the office.

W. H. MINER, INC.—Harold S. Brooks, sales manager, has retired after 33 years of service with Miner. R. J. Olander, who has been active both in the mechanical and sales departments for 35 years, has been appointed assistant sales director. Arthur B. Logan has become assistant to sales director and office and personnel manager.

SAB COMPANY.—Office now at 332 South Michigan avenue, Chicago.



P. N. Strobell



F. Townsend

ALCO PRODUCTS, INC.—The following appointments have been made in the marketing division: *Frederick Townsend*, locomotive product manager, and *Herbert M. Short*, product manager of renewal parts.

INTERNATIONAL NICKEL COMPANY.—*Edmund M. Wise* has been appointed assistant to the vice-president-manager of the Development and Research Division.

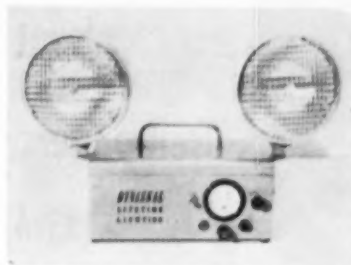
Obituary

PAUL E. WARD, Chicago representative of the Railway Service Division of Oakite Products, Inc., died in an airplane accident near Bloomington, Ill., on January 2.



H. M. Short

NEW DEVICES (Continued from page 6)



Emergency Lighting Unit

This emergency lighting unit, using an hermetically sealed nickel-cadmium battery, is said to give many years of service with no maintenance. The unit includes automatic charging facilities which keeps the battery fully charged at all times. It turns on automatically when power fails and rapidly restores full battery energy once power is resumed.

The power unit is hermetically sealed, requires no addition of liquid and can be recharged over 1,000 times without essential loss of power. It is fully automatic in

operation and contains an automatic high and low rate battery charger to restore full charge in the battery. Hermetically sealed containers are available for use in hazardous atmospheres.

These units will operate at temperatures from minus 25 deg F to 145 deg F. Its dimensions are 17 in. long, 7 in. wide and 11½ in. high with a weight of 13½ lb. Unit mounted lamp assemblies, or with power supply remotely located for multiple lamp installations are available. *Dynasol Lighting Corporation*, 5 Hadley street, Cambridge 40, Mass.

Heating Oil Inhibitors

The formation of copper mercaptide gel in fuel-oil systems can be inhibited effectively with a combination of inhibitors according to test data recently compiled. Mercaptans in fuel oil react with the copper in the brass parts of fuel oil burner systems to form a copper mercaptide. This



INDUSTRIAL HOSE AND FITTINGS

Super resistance to abrasion and corrosion makes this hose excellent for railroads, road equipment, farm machinery, and materials handling equipment. High tensile strength single wire braid. Tough synthetic rubber cover. Working pressures to 2500 psi. Bulk hose and fittings . . . complete hose assemblies at your dealer.

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STRATOFLEX OF CANADA, INC. TORONTO 18, ONTARIO



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LAST UP TO SIX TIMES LONGER...
FOR CONVENTIONAL OR IMPACT USE!**

Because of their unique design, the new Sweeney "Powerench" Sockets last far beyond normal expectations. The above Sweeney Socket was used more than 6,000 times with an impact wrench on traction motor suspension bearing nuts, in one of the roughest tests you can give a socket.

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skyrocketing replacement costs—
speeds maintenance jobs**

Typical Railroad Metallizing Applications

Engine crankshafts, mains, throws, fits • Engine cylinders, liners, liner flutes • Water jackets, camshaft bearings • Generator, traction motor, other armature shaft bearing fits • Compressor crankshafts • Traction motor end housings • Pump rods and shafts • Eroded or corroded portions of engine blocks • Car lighting generator pulleys • Dents and scratches in car bodies

—practically any worn part repaired at only 15 to 20% replacement cost—get equipment back in service in hours, instead of days or weeks.

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SPECIAL RAILROAD BULLETIN AVAILABLE—Illustrates and describes a number of these time-saving, money-saving metallizing applications. Data supplied by railroads using metallizing; photographs taken in user shops. Write for copy.



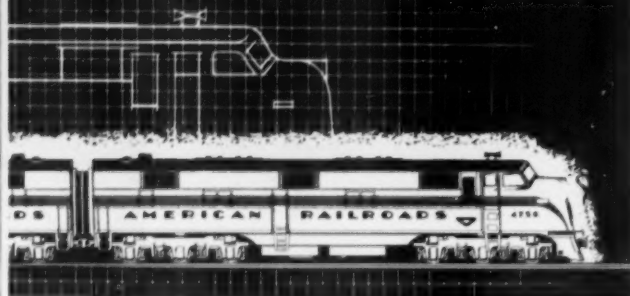
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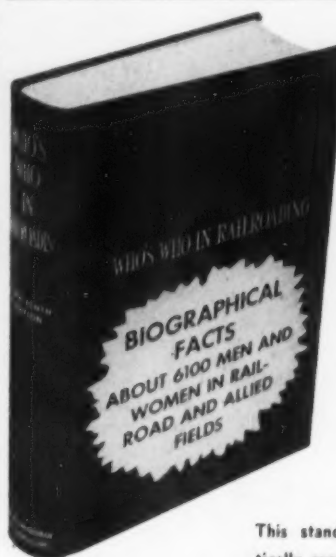
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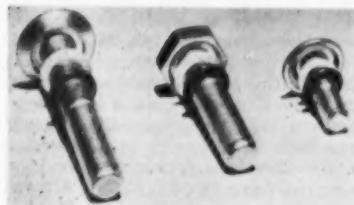
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RAILWAY AGE BOOKS
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combines with fuel oil to produce a yellowish translucent gel which clogs filter screens, causing faulty burner operation. Base fuels from Middle East crudes show a particular tendency to form the mercaptide gel. Mixtures of Santolene H and Santolene C in ratios of 2:1 to 10:1 have been tested and proved effective in fuels produced both from mid-continent and Middle East crudes. The mixtures have minimized gel formation when used in concentrations of 25 to 60 lb per thousand barrels, depending upon the base fuel.

Santolene H is a fuel oil addition agent designed to overcome screen and filter clogging and to inhibit rust and sludge formation in fuel oil. It also minimizes deposits of sludge and sediment on burner parts. Santolene C is a product-soluble rust and corrosion inhibitor for petroleum systems. It is widely used to protect tankers, pipelines, storage tanks and other petroleum product-handling facilities. *Monsanto Chemical Company, 1700 S. Second street, St. Louis 4, Mo.*



Self-Sealing Fasteners

These fasteners for aircraft and industrial use seal the mating surfaces to the head of the threaded fastener and provide maximum shear and tensile strength qualities. Sealing is accomplished by the use of a standard "O" ring which is nestled in the ring groove, cold headed into the fasteners.

The devices are reusable many times without galling or need for lubrication. A thin teflon washer placed between the ring and the head of the fastener eliminates friction and allows rubber to flow evenly in all directions. The bolts incorporate lengths and grips as found in AN and NAS standards. The fasteners available in popular head styles, including the 100 deg countersunk type, come completely assembled and ready for use. *Aero Bolt & Screw Co., Inc., 1071 West Arbor Vitae street, Inglewood Cal.*

Right Angle Socket Drive

Sockets that cannot be driven with the standard ratchet because of surrounding interference may be operated with the Reece. This tool is a geared, right-angle adapter designed to work in hard-to-get-at places. The sturdy construction of the Reece tool is designed to withstand

torques in excess of ratchets of equal driving power. The tool has an approximate gear ratio of two to one and a rating of 1,500 in. lb. It can be used with electric or air motor drive. *Reece Tool Corporation, Cleveland 15.*

Heavy Single-Coat Paint

Amercoat No. 87, a vinyl-resin coating, permits the application of a dense, heavy film to a thickness of 10 mils with only a single spray application. It must be applied over a special Amercoat primer and not on bare metal surfaces. The smooth, tough non-absorbent surface produced is easy to clean. It is also reported to be abrasion, temperature and weather resistant, to be a non-inductor of electricity, and to be very flexible. It is also said to offer excellent resistance to water and to the chemical fumes produced by acids, alkalies, salts and solvents.

Although Amercoat No. 87 has a much high solids content than standard vinyl-resin paints, the coating is easily applied with conventional industrial spray equipment. It does not sag or run despite its heavy single coat, and is claimed not to flow away from edges and sharp corners. It is available in black, gray, white and aluminum. *Amercoat Corporation, 4809 Firestone boulevard, South Gate, Cal.*



Motor Alternator Power Supply

Train radio power can be supplied by two types of motor alternator power supply sets designed for application to locomotives, cabooses and other rolling stock. The sets have a power output suitable for one radio receiver and one 10- to 30-watt transmitter. One model is of open construction suitable for interior mounting only. The other is totally enclosed and can be used inside or outside any type of rolling stock. This unit meets AAA spec #12-10 requiring weatherproof and dustproof housings.

Both sets meet the electrical require-

FRAHM® and JAGABI® Speed Measuring Instruments



... to meet every requirement
Write for Bulletin 35-X

MEGGER® Electrical Resistance Measuring Instruments



... for all electric, Diesel-electric locomotives and other electrical equipment testing requirements.
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USE
F.O.-102
the chlorinated
CARBON REMOVER
for Hot Tank Dip

To speed the cleaning operation of DIESEL PARTS put F.O.-102 to work in your maintenance departments. This highly effective cleaner has been thoroughly tested to assure top performance. . . . When used in the prescribed manner it will save hours of hand labor and add to the life of pistons, piston rings, fuel pumps, carburetors and engine assemblies.

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- May also be used as a cold dip
- Meets the requirements of AF-20043A

For Cold Dip—Use fast acting

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(non-inflammable — low toxicity)

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F.O.-128 and F.O.-101—Safe-tee Solvents
F.O.-106 and F.O.-116—Emulsion Cleaners

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ments of AAR specs 12-10 and 12-22. The open model is rated at 117 volts a-c, 60 cycles, 3,600 rpm and 300 watts continuous at 0.9 power factor. The totally enclosed model has a rating of 175 watts continuous at 0.9 power factor, but has an intermittent rating of 300 watts as required by AAR spec 12-10. The power supply units can have input d-c voltages of 32, 64 or 115 volts. A static Tyrite resistor control system is designed to give good regulation for a varying input voltage. For example, on locomotives the output can be regulated for 117 volts a-c when input varies from 60.5 to 80 volts d-c.

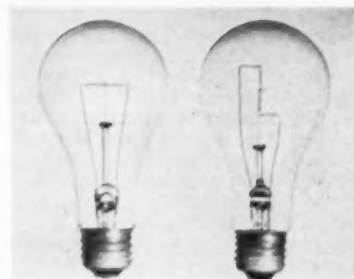
No external fuse protection is required since the sets have built-in automatic reset overload protection. The totally enclosed model has both input and output circuits filtered for radio frequency to prevent commutation noises from entering the radio-telephone equipment. These filters are housed in a cast aluminum box attached to the main control box which is also an aluminum casting with watertight seals. Designed with two-unit, two-bearing construction, the sets have rubber mounted brush holders and bearings. Total weight including the resilient-mounted base and control box is 97 lb. *General Electric Company, Schenectady 5, N. Y.*



Inspection Goggles

Under close overhead lights the gold lenses of these inspection goggles are said to reduce eye fatigue and eye strain by softening glare and absorbing the harmful effects of ultra-violet rays. The lenses optically perfect, are made of 0.080 in. shatterproof methacrylate and give excellent protection against flying particles.

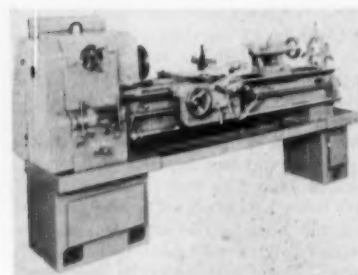
These interchangeable gold lenses are available in lightweight Tuc-Away safety spectacle frames with adjustable metal or plastic Retrax temples of plastic club temples. A universal nosepiece fits all workers comfortably. For protection from impact and glare the lenses are also available in clear or light, medium and dark green. *Watchmokit Optical Company, 232 West Exchange street, Providence 3, R.I.*



Incandescent Lamp

Filament design of GE incandescent lamps, changed to give greater illumination with the same current consumption, mounts the filament lengthwise in the bulb instead of across it. The coiled-coil filament will be universal and will replace the single coil filament previously used. The result of these changes is an increased light output of 6 per cent for household bulbs and an industrial-bulb output increase of as much as 15 per cent.

The change is immediately available in the 750- and 1,000-watt sizes where it is said to have maximum benefit. It will be extended to the smaller lamps over the next few years as rapidly as necessary production equipment can be installed. Household bulbs already use the coiled-coil filament. The axial filament location will permit the filament to burn at higher temperatures without shortening life, and will cause bulb blackening to be concentrated in a smaller area, permitting more light to get out. *Lamp Division, General Electric Company, Nela Park, Cleveland 12.*



Engine Lathes

The all-gear head, Model LE engine lathes have twelve spindle speeds in geometric progression controlled with a three-lever color-match, direct-reading shift mechanism. The spindle, with taper key drive nose, is rigidly mounted in three precision anti-friction bearings. All headstock bearings are pressure lubricated with filtered oil. Available through the totally enclosed, automatically lubricated quick-change gear box are 48 thread and feed changes.

The apron is a one-piece, double-walled casting with automatic lubrication. Longitudinal and cross feeds are engaged with drop levers operating positive jaw clutches, and a spindle start-stop control lever is supplied at the apron and at the quick-change box. The bedways are ground, and

can be flame-hardened. Lubrication of the ways and cross slide is by an oil shot system in the apron.

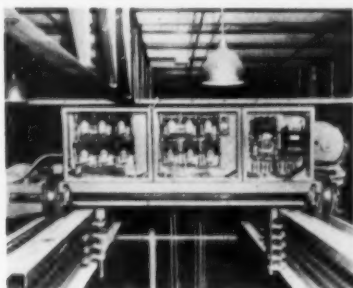
A fully enclosed electrical panel is protected with a built-in disconnect switch on the door that prevents exposing a live panel. A transformer provides 110-volt power at the pushbuttons for safety. There are tray-tops on the headstock and tailstock, and cabinet legs.

These engine lathes are built in 10-, 12½-, 15- and 18-in. sizes and can be powered with 1-, 1½-, 2- or 3-hp motors. The motor is mounted on the rear of the headstock leg. *Cincinnati Lathe & Tool Co., Cincinnati 9.*

Self-Cleaning Solder and Flux

Fas-Tin contains a flux that makes possible a solder job where it is considered impossible to adequately clean. The solder overcomes dirt and residue through a dual action—first chemical treatment results in the forming of an envelope around each particle of powdered solder; second, the solder is then suspended in a scavenger flux.

The flux cleans the dirt and suspends the surface oxide. The envelope around the solder particles lowers the surface tension of the solder and metal to which it is applied to release solder particles and uniformly coat the metal. The solder works on all metals except aluminum. *Farrelly Company, 1241-A North 26 street, Philadelphia 21.*



Crane Control Conversion

Infrequently used overhead cranes can be made floor-operated instead of cab-operated with specially designed package controls. The pendant control operation is said to produce large annual savings with a small investment. Separate package control units have been designed for the trolley, bridge and hoist controls, and can be supplied for a-c or d-c applications. Each of the individual steel cabinets is 20¼-in. high and 13-in. deep. Widths vary with the number of control components necessary. The lighter components such as contactors, timers and relays are front mounted and are easily removed. Resistors are rear mounted. *Westinghouse Electric Corporation, Merchandise Mart, Chicago 54.*

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teries in your equipment. Why?

Because C & D batteries meet

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retention "shedding" is no

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capacity!

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2. Steady uniform voltage
3. Reduced maintenance requirements

For complete details, write for Bulletin AC-546



BATTERIES, INC.

of Conshohocken, Pa.

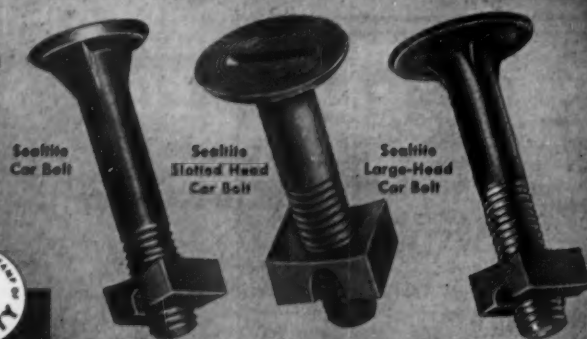
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Sealite bolts are available with Lockite Nut #2 (shown), or std. sq. and hex. n.

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New facts about an old problem, wheel slip—and how to eliminate it

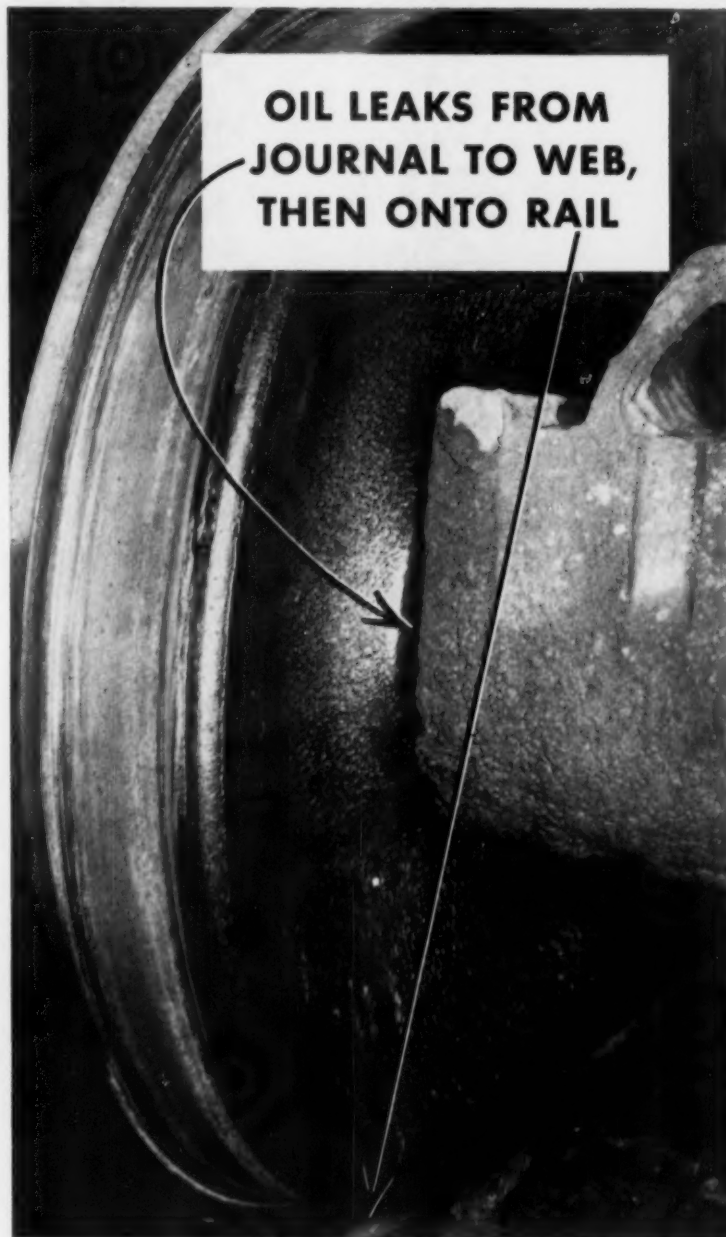
RAILROADS have become increasingly aware of diesel-electric locomotive wheel slip. And they've discovered that a major cause of slip is oil leaking onto the rail from the journals of friction-bearing-equipped freight cars. Oil runs down the wheel web to the tread and is deposited on the rail. And then it is spread over the rail by fog, dew, or light rain.

When a diesel-electric locomotive hits an oily section of track, the driving wheels slip and motor armatures overspeed. This can cause "flashover" in both traction motors and generators and can result in (1) burned-out armatures and loosened windings, (2) locked axles (causing flattened wheels, scored rails and sometimes wrecks), and (3) repairs on locomotive generators and drive motors.

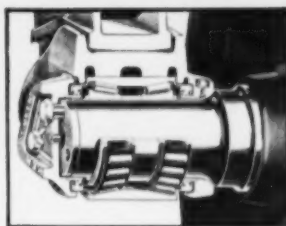
Some railroads are installing "slip indicators". These pinpoint *where* the wheel slip is occurring. But they can't eliminate the cause.

Timken® tapered roller bearing sealed units *prevent* lubricant loss. And Timken bearings are normally lubricated with grease, which tends to stay where it belongs. By eliminating this major cause of wheel slip, Timken bearings allow railroads to utilize more fully the greater motive power of diesel-electric locomotives. And they make possible large savings in generator, motor and wheel and rail maintenance costs.

Timken tapered roller bearings eliminate the hot box problem and reduce operating and maintenance costs to a minimum. Now, doing away with the wheel slip problem is still *another* advantage of Timken bearings. A Timken Company engineer will be glad to show you how. Write, wire or phone, The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".



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